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NOVEMBER 17, 1888.

THE AMERICAN ARCHITECT AND BUILDING NEWS

VOL. XXIV. REGULAR EDITION NO. 673

ARCHITECTURE

ENGINEERING

DECORATION

CONSTRUCTION

TICKNOR & COMPANY

BOSTON MASS.

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REVIEW OF THE PRINCIPLES OF SANITARY PLUMBING AS NOW ACCEPTED BY ALL LEADING SANITARIANS.

THE main object to be attained is the complete removal of waste matters from the premises the instant they are generated. This can only be accomplished by observing the following rules:—(1.) Avoid all cesspools. (2.) Make all waste-passages as small as possible to effect their purposes. (3.) Construct every fixture on the principle of the flush-tank. (4.) Make every trap seal-retaining and self-scouring. (5.) Make all joints tight. (6.) Select the simplest appliances and the simplest system consistent with safety. These rules are self-evident enough to be accepted as plumbing axioms, and are sufficient to produce perfect work. The "Sanitas" Appliances have been constructed with a view to their fulfilment in every respect, and an examination of the steps leading to the development of these appliances will best illustrate the principles of Sanitary Plumbing, showing the faults which should be avoided, and the objects which should be sought.

Beginning with the trap: In the first place mechanical seals have been discarded as being unreliable, unnecessary, and as obstructing the water-way. We start with the simplest form of water-seal trap, the ordinary S-trap. This

trap answers all our requirements except that it has no power to retain its seal under the variations of atmospheric pressure occuring within the waste-pipes. To remedy this deficiency the pot-trap was developed from the S-trap by simply enlarging its upcast limb, a sufficient enlargement gives it a temporary power of resistance, but creates a cesspool having no self-cleansing power and, accordingly, the trap clogs, under sinks, with

grease and ultimately loses its original resisting power. To avoid this difficulty we have turned the pot-trap on its side and reduced the size of its body. This permits the air to pass through the trap above the water without driving the latter out before it, as would be the case with a

perpendicular body equally reduced in diameter. To still further increase the power of resistance to siphonage the body was next bent into a quadrangle, giving several reflecting surfaces, which throw back this water under siphoning action while they allow the air to escape, and, finally, the two parallel sides of the quadrangle were merged into a single body having a reflecting partition and a large clean-out cap. This gives us the perfected Sanitas-Trap, which

has proved itself to be both anti-siphonic in properly arranged plumbing-work and substantially self-cleansing either with or without venting. It is more resisting than a vented S-trap.

The Sanitas is a Scientific System of Plumbing, having Simplicity and Safety for its Basis. It is also by far the most Economical System.

SANITAS

APPLIANCES

PLUMBING

Avoid Infringements and Imitations which are described as being "as good as the 'Sanitas;'" they are not, they are very inferior as well as illegal.

Considering next the Lavatory. These should always be constructed on the principle of the flush-tank, their discharges filling the water-passages "full-bore," so as to keep them clean. The overflow and outlet passages should be combined in the form of a stand-pipe, thus doing away with the usual foul, inaccessible and badly jointed lead overflow-pipe, and the troublesome and dirty plug and chain. The stand-pipe should be operated by a simple mechanism above the slab, for convenience and cleanliness, requiring but a single movement of the hand, and all parts should be of solid and durable construction, while the stand-pipe should be easily detachable for cleansing. The Sanitas Lavatories are all constructed after this principle, and they are the first ever so constructed. The stand-pipes are made of either plated metal or of earthenware, like the fixture itself, and the whole device produces a very ornamental effect, especially when decorated in colors to correspond with the decoration of the earthenware bowl. Finally, the ideal water-closet should have the simplicity of the short-hopper, with the sanitary advantages and convenience of the improved modern closets. More than this, it should be practically noiseless, anti-siphonic, quick-acting, self-sealing, and free from spattering or waste of water. These desiderata have been attained in the Sanitas Water-Closet of which we sketch the outline in section. The supply-pipe between the cistern and the closet discharges into the latter below the level of its standing water, and being without air-pipe, stands permanently full of water, hence the action is instantaneous and the noise of flushing is deadened. This and the peculiar construction of the flushing-rim and water-supply passages cause the waste to be discharged with wonderful speed and effectiveness; and at the same time so quietly that with the cover down and the toilet-room door closed, no sound of flushing can be heard from without. The closet is highly ornamental in appearance, hence no other wood-work is required than the seat and cover, and these may be supported directly on the earthenware itself, which is constructed with this in view. The Sanitas System, taken together, is the most economical as well as the only safe system of plumbing, as avoiding the dangers and complication of special trap venting. Whether vented or not it is now admitted that safety requires a trap to be *anti-siphonic*, the vent-pipe alone not being reliable. The Sanitas Trap holds sufficient water to resist, when properly set, any *back pressure* that can occur in good plumbing with properly vented soil-pipes. For more detailed description and illustration of the Sanitas Appliances, see our other Advertisements and the Circulars of

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THE *Engineering and Building Record* brings up a point, in answer to a correspondent, which is well worth discussing, if the discussion will elicit the results of the experience of architects or builders. The correspondent asks how much the lower half of a brick wall one hundred feet high will settle while the upper half is being built; and the editor, while calling attention to the importance of the question, mentions, as the only definite measurement which had come to his knowledge, that nine feet at the bottom of a high wall settled three-eighths of an inch during the completion of the building. We think most persons of experience would consider this a small settlement. Where a new building is constructed by the side of an old one, using the old wall as a party-wall, and erecting a new wall parallel with it to enclose the opposite side of the structure, the floor-beams, if laid level from the holes cut in the old wall to their places on the new one, would, when the house was finished, be lower at the end next the new wall than the other. It is usual with masons to allow a correction for this, laying the beams higher at the end on the new wall, so that when the weight has been added they will be found to have settled to a level. If we are not mistaken, the allowance made for this purpose is five-eighths of an inch for each story, where the new wall is of common brick, with joints of the ordinary thickness. This, of course, is only a rude approximation to the exact correction, as the settlement goes on continuously while the wall is in process of erection, and for some time afterward, but it answers a tolerably good purpose, and with different mortars, or different methods of bricklaying, the compression might be more or less. One thing which should not be forgotten, and which is, perhaps, more easily determined with accuracy than the compression of fresh mortar, is the settlement of old brickwork under a newly added load. All architects have seen old party-walls extended upward, and seen, also, that the old brickwork settles materially under the additional weight. We remember one instance where an old party-wall was lined up, and built upon from the top upward to a height of some sixty feet. The old brickwork settled, apparently throughout its whole extent, but the effect was naturally greatest at the top, where a movement of nearly two inches seemed to have taken place, dislocating the stone cornice and the upper window-dressings nearest to the party-wall, so that they had to be rebuilt. These walls were built with a large dose of cement in the mortar. How the effect would have been modified with more or less cement is an important question.

THE discussion of the dispute between Mr. E. R. Robson and the London School Board has called out a letter in the *Builder* from one of Mr. Robson's clerks-of-works, of a very different stamp from the individual whose description, as given by himself, we mentioned recently. The *Builder's* correspondent, Mr. Phillips, explains the matter of the staircase which was built with insufficient head-room, by saying that it was an ingenious device, or, rather, an adaptation of an old plan, for getting two staircases in the space of one, by providing a mezzanine at half the height of the story. He had himself carried out staircases of the same sort in others of Mr. Robson's school-houses successfully, the minimum headway being six feet and a half, but the ingenious person who "did not care to furnish other people with brains" seems to have got hopelessly muddled over the plans, and to have been too egotistical to conceive the possibility that the mistake might have been in himself, instead of the drawings. Besides the trouble with this, and possibly other incompetent clerks-of-works, Mr. Phillips says, what is well worth noting, that the practice adopted by the School Board of paying contractors every month enabled builders of little capital or credit to obtain contracts, which they carried out after the manner of their kind. In one case under his charge the proposed site of the school was partly occupied by a brick cottage, which, under the contract, was to be torn down, and the materials removed by the builder. Coming to the place late one forenoon from other buildings under his care, he found that the cottage, which the day before was intact, had disappeared. The foreman, on being asked how it was got away so quickly, answered, with many smiles, that "they had a lot of carts there early, and carted it all away." Mr. Phillips, who appears to have the tact of a born superintendent, thought there was something abnormal about the foreman's cheerfulness, and looked about with special care. A trench had been dug for the concrete footings of one of the walls, and this he found filled and nicely levelled up with fresh concrete. He ordered some of the concrete dug out, and discovered that it was only six inches deep, and that underneath lay what he calls "the grave of the old cottage," consisting of a mass of bricks, plaster and other rubbish, which, instead of being "carried off early in carts," had been simply dumped into the trench, previously prepared for it by daubing a little concrete over the bottom and sides, and covered with a layer of concrete over the top.

A QUESTION is sometimes raised as to the antiquity of the five per cent architect's fee, and it is interesting to know that it had been established by immemorial custom as early as the year 1800. In February of that year, the twelfth Pluviôse of the eighth year of the millennium ushered in by the French Revolution, the Conseil des Bâtiments Civils reported to the Minister of the Interior that it was "a custom which had always served as the rule, and which ought to determine the rulings of the courts in such matters," that the architect was properly entitled to five per cent on the cost for "making plans, directing the work (*conduite des ouvrages*), and examining and adjusting the accounts for ordinary buildings in Paris, but that for buildings at a greater distance than three miles from his residence double fees should be allowed, the architect paying his own travelling expenses"; and that if, "as sometimes happens, drawings or models were required which occasioned unusual expense, the value of these should be estimated and paid separately."

A NEW English trick is described in the *Builder*, against which some of our readers may be glad to be warned before it becomes acclimated in this country. As described by Mr. W. H. Bidlake, an architect who has been made a victim, the fraud is a simple one. The inventor of it, a man of about forty, with "a sandy moustache," whose "writing and spelling are emphatically bad," makes his appearance in a town and buys a lot of land. He then calls on some architect, whom he employs to make plans and specifications for a building on the lot, and to obtain tenders. These are procured, and a contract signed. The architect is particularly requested to have as much material as possible delivered on the ground ready for use, "to avoid obstructing the roadway." The work is begun under the contract, and pushed by the builder, to whom, however, the speculator thinks it imprudent to make any payments until

the roof is on. By the time the building has reached this stage, the proprietor has made arrangements for placing a large mortgage on the building and ground, and as soon as the money is in his possession he disappears with it, leaving the mortgagee to take possession of the estate, and the builder and architect to console themselves with the reflection that they have gained a valuable experience in return for their time and money. Mr. Bidlake says that the individual whom he describes has carried out similar schemes in at least six different towns, to his knowledge.

THE demolition of the gigantic steamship, the "*Great Eastern*," which is now nearly complete, recalls some of the singular hopes and disappointments which attended the early adventures of that wonder of our boyhood. Although several Atlantic steamships now in service nearly approach the "*Great Eastern's*" dimensions, none have yet reached them, and thirty years ago she was one of the wonders of the world. At that time emigration to Australia was increasing rapidly, and it seemed as if a ship large enough to take out a whole colony at once would be popular and profitable. With this idea the "*Great Eastern*" was designed, for a company formed expressly to build and use her, by the younger Brunel. For some reason, the estimates of cost which had been made proved very inadequate, and the company which owned her was ruined before her completion, winding up its affairs in bankruptcy, after spending eight million dollars on a ship still unfinished. After much trouble, money was raised to complete and equip the vessel; but she was unfortunate from the first. On one of her earliest trial trips a serious accident took place on board, and her enormous bulk made it difficult to manage her, or even to enter most harbors. The idea of sending her regularly to Australia was abandoned, and she was tried on the route between Liverpool and New York. She made one or two trips successfully, and the spaciousness of her decks and saloons would have made her popular with travellers, if it were not that her size made it difficult to get her over the bars, both at Sandy Hook and at the mouth of the Mersey, while, if we recollect rightly, she could not be brought to any pier in New York, but had to anchor in the Hudson River, off Twenty-third Street, and transfer her passengers to tenders. After it was found unprofitable to use her as an Atlantic liner, she remained idle for a time, until it occurred to some one that her immense hull would be well adapted for storing the coils of telegraph cables, which, after the success of the first Atlantic cable, were being laid all over the world. The earlier Atlantic cables, in default of vessels large enough to carry the whole of a rope three thousand miles long, were laid from two ships, each carrying half the line, and moving from mid-ocean in opposite directions. The objection to this, aside from the expense of the double equipment of ships, instruments and apparatus, and electricians, lay in the danger that the two vessels might drift or be blown asunder, so as to break the cable. This happened several times, and the opportunity for doing the whole work with a single ship like the "*Great Eastern*" seemed very advantageous. The demand for such service was, however, only temporary, and the huge vessel was soon laid up in idleness again. After resting for several years, she was sold, at a disastrous sacrifice, to be used in carrying coal from the mining region to London. Her unwieldly size seems, however, to have interfered with this sort of service, and she was soon put out of commission again, and moored in Liverpool harbor, where she was shown as a curiosity, and served to attract many visitors. The income derived from this source was too small to pay for the care of the ship, and she was finally sold at auction, some six or eight months ago, as old junk, with the understanding that she must be broken up as soon as possible, and got out of the way. Some enterprising contractors were bold enough to bid a hundred thousand dollars for her, and her plates will soon be scattered through the English rolling mills whence they came.

A CURIOUS illustration of the progress which has been made in naval design is furnished by the fact that her dimensions and construction were such that she could not be adapted to modern marine machinery. Unlike the great ships of the present day, which measure in length, as a rule, ten times their breadth, the "*Great Eastern*" was eighty-three feet wide, with a length of six hundred and seventy-nine feet. She was originally fitted with side-wheels, as well as a screw. The latter was driven by an engine of sixteen hundred horse-power, while another engine of one thousand horse-power moved the side-wheels. The two sets of engines together exerted only twenty-six hundred horse-power, a force which would be thought in these days very inadequate to the propulsion of such a mass, while, owing to the wastefulness of the old marine engines, her consumption of coal was three hundred tons per day. It is true that such ships as the "*Etruria*" and "*Umbria*" burn very much more than this, while at high speed; but their triple-expansion engines enable them to get far more work out of a ton of coal than was possible with the "*Great Eastern's*" engines, while the comparatively light construction of the latter vessel made it impracticable to fit her up with the powerful machinery which serves to drive the strong and thoroughly braced steamers of the present day through the water.

THE daily papers interest themselves a good deal in the twenty-eight-story building which it is proposed to erect in Minneapolis. We do not know whether the scheme is a serious one, but, if so, we are decidedly inclined to agree with the persons who believe that such inordinately lofty structures are not likely to prove profitable to their owners. There is no doubt that, with care and skill, a very lofty office-building or apartment-house may be so constructed as to be safe against ordinary sources of danger, but it is also certain that very few buildings of the kind are so constructed, and nearly all the twelve or fifteen story structures that we know have, within a few years after their erection, shown signs of movements which must inevitably lead to speedy deterioration, if not total ruin. In most cases, the cracking and twisting, which the observant eye readily detects, appear to come from unequal settlement in different portions of the walls, and in the substance of the walls themselves, and such unequal settlements would be increased by carrying the masonry to a greater height, unless the usual system of building were modified, by abandoning close jointed facings to rubble or rough brick walls, and constructing all exterior and division walls of block-stone, of nearly the same dimensions throughout, and laid with mortar joints of uniform thickness. This would add considerably to the cost of the building, and increase the amount which must be charged for rents in it. Moreover, even if properly and safely constructed, such a building would have many objections, from which more modest structures are exempt. We ought never to forget that we live in a country where earthquakes are tolerably frequent. Probably each one of our readers has felt one or more shocks, strong enough, perhaps, to shake bricks off a chimney-top, and the effect of such shocks at the top of a building three hundred feet high would be so vigorous as to frighten the tenants of the upper stories, if nothing worse. More than fifty years ago there was an epidemic of lofty buildings in New York, and, although elevators were then unknown, six, seven or eight stories were not considered too much to place over the valuable lots in the lower part of the city. Between 1830 and 1840 some earthquake shocks were felt in New York, and the owners of the taller buildings made haste to cut off the upper stories and reduce them to more stable proportions. What would be the effect of a lively earthquake shock on the tenants of a twenty-eight-story building may be imagined, and the fall of a person from an upper window, or any one of a dozen probable accidents, would depopulate all the structures over a certain height in Minneapolis, or in other town that might follow its example.

EVERY engineer knows something of the cheap coating for steam-pipes, made of sour flour and plaster-of-Paris, mixed, allowed to ferment a little, and spread on the hot pipes to bake, which is often used here. This, we should think, might tend to corrode the iron pipes, and a useful substitute may be found in a sort of sawdust pudding, which has long been employed in the great pen manufactory of Blanzy, Poure & Company, at Boulogne, and is described in the *Revue Industrielle*. The dough is made by mixing flour paste and sawdust into a compact mass. If the pipes are of iron, clean, and free from grease, it may be applied directly, to the depth of an inch. A mixture of two parts wheat to one of rye flour gives the best paste, and, when prepared with fine sawdust, freed by sifting from lumps, it adheres perfectly. For brass pipes a wash of clay, mixed with water, should be applied before putting on the paste, or twine may be wrapped around the pipe. The paste should be put on in two or three layers, each being allowed to dry before adding the next, and when all is dry, two or three coats of coal tar, put on with a brush, will prevent deterioration from dampness.

BUILDERS' HARDWARE.[1]—XII.

PULLEYS.

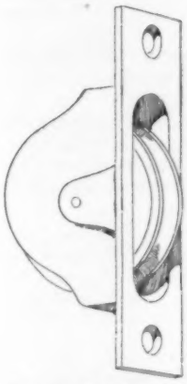

Fig. 162. Ordinary Axle-pulley.

ALMOST the only forms of pulley used by builders are those which are employed for double-hanging windows. These are made with cast-iron frames for the cheaper styles of work, or frames of malleable iron for a better class of goods; while some manufacturers use wrought-iron entirely. The wheels are usually made of cast-iron, with a groove shaped to receive the sash-cord or chain. The pulley is fitted in a mortise cut into the face of the hanging-style of the window-frame, and the part visible, or the face, is made of almost any material, but most often of bronzed, nickel-plated, painted or japanned iron. The commonest form is bronzed iron. The axles of the wheels are of steel or gun-metal, and the wheels themselves in the better class of goods are turned to accurate dimensions, though some cheaper grades are simply cast and polished. Some manufacturers finish pulleys with plain or ornamented bronze faces, in which case the face is made of a separate piece of metal, riveted to the iron frame of the pulley. There are also in the market, a few fine grades of pulleys made with brass wheels and cast-brass frames. This is, however, a needless expense, and such pulleys are used more in connection with furniture than with building.

The essential qualities of a good pulley-wheel, are simply that it shall run lightly, smoothly and easily. There should be a broad hub on the axle in order to prevent the flanges from jarring or rattling against the pulley frame, and the wheels selected should be of such a size that when the face-plate is mortised-in flush with the face of the hanging-style, the inner edge of the wheel will be over the centre of the box, so that sash-weights will not strike against the frame when raised or lowered.

Sash-pulleys are usually made in five sizes: 1¾ inch, 2, 2¼, 2½ and 3 inches, the size referring to the diameter of the wheel. The two-inch wheel is sufficiently large for most cases, but for heavy, plate-glass windows larger sizes are used, though the chief advantage of a large pulley is not so much that it will wear better, but that it will throw the sash-cord farther away from the hanging-style, and so permit of larger sash-weights. When the expense is not an item to be considered in the selection, it is well to employ some form of anti-friction, ball or pin bearing pulley for all sash weighing over fifty pounds. A poor pulley will soon wear loose so as to rattle on the axle. If anti-friction wheels are not advisable, the next best form is one with a large gun-metal axle. Some compositions of phosphor-bronze would seem to be peculiarly well suited for pulley axles, though not at present in the market to any extent.

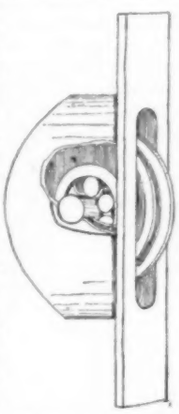

Fig. 163. Anti-friction Sash-pulley. Moore Mfg. Co.

There are a great many varieties of sash-pulleys, though the differences are so slight that a few examples will serve to illustrate the whole. Figure 162 is a fair type of the ordinary axle-pulley, and Figure 163 is a type of the best form of anti-friction sash-pulley. All of the most commonly used forms of sash-pulleys are on essentially one or the other of these lines.

The only important deviations from the common types of sash-pulleys have been made with a view to reducing the amount of labor required to properly set the fixtures in the window frames. It should be said that none of the patent forms have thus far met with either very wide sales or general approval, which would seem to indicate that the common form answers pretty fully all the requirements of the case. There are, however, a few styles which have met with considerable favor in the market, and which will serve to give an idea of the lines the attempted improvements have followed.

[1] Continued from page 219, No. 672.

Figure 164 illustrates a form known as the "Empire" sash-pulley, in which the case is corrugated horizontally so that it will exactly fit into a series of holes bored into the frame with an auger or bit of standard size, a great reduction in the labor of mortising thus being effected. The advantages claimed for it are that it cuts away less of the frame than any other pulley, is held more securely, does not require any screws, and can be inserted much more readily and quickly than any other kind. It is claimed that these pulleys can be fitted to the window frames at the rate of sixty per hour.

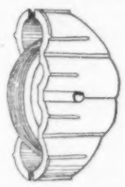

Fig. 164. Empire Sash-pulley. Empire Portable Forge Co.

A pulley requiring even less work in setting, though somewhat more complicated in construction, is shown by Figure 165. This consists of two small wheels set in a cylindrical case, and requiring no more labor to fit in place than is involved in the boring of a single hole. Shoulders or flanges at top and bottom of the case serve to plumb the pulley properly, and kept it from twisting. It is claimed that this pulley will hold its position quite as well as any other form, though it would seem more apt to work loose by reason of the leverage of the weight over the inner wheel, than the ordinary form.

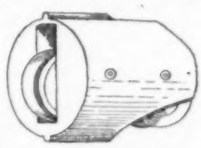

Fig. 165. Corey's two-wheel Sash-pulley. J. B. Johnston.

Another style of pulley which does not avoid cutting the mortise on the frame, but saves somewhat in the screws, and has a finer appearance than either the "Empire" or the "Corey," is shown by Figure 166. In this pulley the face-plate and frame are cast together, and the frame is made with a wide shoulder or flange at the bottom, which is cast on a bevel, so that when placed in position in the rebate, the pulley cannot slip down or out, by reason of the bevel wedging into the mortise. A single screw at the top of the pulley holds it securely in place; but it will be seen that it does not depend upon the screw for its stability. With an ordinary pulley, the heavier the sash the greater is the possibility of the wheel being forced out from its mortise, whereas, with the "Norris" pulley, the greater the load, the more securely is it wedged in place. Another obvious advantage is that it requires just half the quantity of screws and amount of labor to set this pulley as it does the ordinary pulley; and it is said that the carpenters who have used this, have liked it very much. The labor of mortising is slightly more than for the ordinary form, but the company controlling the patent also manufactures a mortising-machine specially adapted to this kind of work, by which the labor is greatly reduced. Aside from the labor of mortising, the only possible objection to this sash-pulley seems to be that it would require a pretty heavy hanging-style to the window frame, and would cut away the wood a good deal, the bevelled flange being three-quarters of an inch through for an ordinary sized pulley. This patent is manufactured in the same sizes and styles as the ordinary pulleys, including those with flat-grooved wheels for sash-chains.

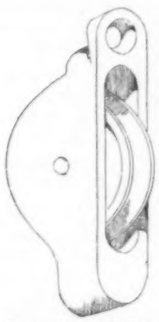

Fig. 166. Norris Pulley. C. Sidney Norris & Co.

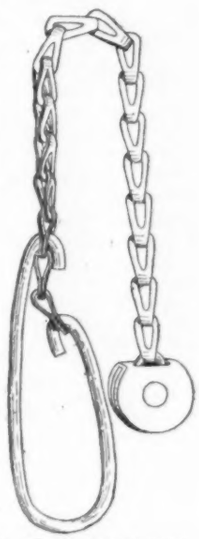

Fig. 167. Single Sash-chain. Smith & Egge Mfg. Co.

The following table gives the average retail prices of the principal marketable varieties of ordinary sash-pulley wheels.

TABLE OF SASH-PULLEYS.— PRICES PER DOZEN.

Description.	1½ in.	2 in.	2½ in.	2½ in.
Painted iron, cast wheel	$ .25	$ .30		
Bronzed iron, steel axle, cast wheel	.50	.65	$ .70	
Bronzed iron, steel axle, turned wheel	—	.90	1.10	$1.35
Bronzed iron, anti-friction steel axle, turned wheel			1.75	2.00
Polished brass face, anti-friction steel axle, turned brass wheel			5.50	6.25
Brass or bronze face, steel axle, polished iron wheel		1.35	1.75	
Corey's fine bronzed iron, steel axle, turned wheel	.60	.75		
Empire fine bronzed iron, polished face and wheel		.45		
Norris's fine bronzed iron, polished face and wheel	.49	.50	1.10	
Smith & Egge, polished iron, flat grooved, turned wheel		2.25		2.65
Smith & Egge, polished iron, 3-inch double grooved wheel	$ 8.00			
Smith & Egge, polished iron, 4-inch double grooved wheel	13.50			

SASH-CHAINS AND WEIGHTS.

In the better-class of buildings it is usual to hang all sashes weighing over forty pounds with some form of sash-chain; indeed, except for the expense, it would often be well to use nothing but chains, especially in buildings of a public character where the windows are apt to be moved with little care. The ordinary cords used for windows are liable to wear out and break, and experience has often shown that a good sash-chain will outwear enough of the ordinary sash-cord to make it more than worth while to use the stronger material.

The sash-chain, which appears to meet with the greatest favor in the Eastern market, is that which is made by the Smith & Egge Manufacturing Company. The form of this chain is illustrated by Figure 167. It is a species of flat-link chain, the form being the same as the well-known plumbers' safety-link, which has been in use for various purposes for a great many years. Smith & Egge adopted this form as best adapted for window-chains, and they have perfected special machinery which does away almost entirely with handwork, and enables them to produce the chain at marketable prices and of a superior quality. The chain is made with a great deal of care, each link being automatically tested as it leaves the machine. The metal preferably employed for this purpose is a bronze composition specially prepared by the manufacturers, designated as "giant metal," which is, in appearance, very much like pure copper, but is tougher and harder. A cheaper composition is also used, which is known as "red metal," and steel chains are manufactured to a certain extent, though the giant-metal chains are the best in every respect. The best giant-metal chains will sustain loads as high as 700 pounds. The red-metal chains are manufactured to sustain from 380 to 500 pounds. Steel chains are made in three grades: one capable of sustaining from 125 to 175 pounds; another from 400 to 450; and the strongest from 600 to 700 pounds.

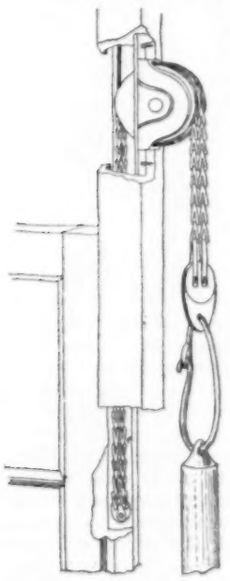

Fig. 168. Double Sash-chain. Smith & Egge Mfg. Co.

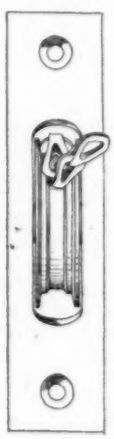

Fig. 169. Grooved Sash-chain Pulley. Smith & Egge Mfg. Co.

Instead of one chain, it is often more desirable to use a double chain for very heavy windows, as shown by Figure 168. This figure, and Figure 167, also show the manner in which the chain is attached to the sash and to the weights.

Pulleys intended for use, with sash-chains, require a different groove from that usual where rope is employed. The Smith & Egge Manufacturing Company has a special form of pulley intended to go with their goods, Figure 169. For convenience this pulley has been listed with the others in the preceding table of prices, together with one or two different makes of flat grooved-pulleys which would answer for the purpose equally well.

What has been said of the Smith & Egge chains applies equally well to the "Champion" sash-chains, manufactured by Thomas Morton, which have the same shape of link, though the sash and weight fastenings are slightly different. The "champion" metal is a bronze composition probably not differing essentially from the giant or the red metal. Thomas Morton, however, manufactures another form of sash-chain with quite a different link, which is shown by Figure 170. This is known as the cable-chain, and is a very strong, durable form, never twisting or kinking. The sash attachment used with this chain is very simple and efficient, consisting of a short half cylinder with a slot cut down from the top, wide enough at the bottom to admit a link of the chain, but narrowing at the top so as to prevent the swelling at the link-joint from passing through. The same sort of slot is cut in the weight-hook to hold the other end of the chain.

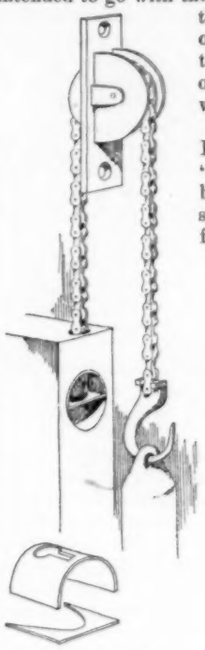

Fig. 170. Cable Sash-chain. Thomas Morton.

Fig. 171. Solid Link Sash-chain. Solid Link Sash-chain Co.

The cable-chains are usually made with alternately two and three pieces to each link, joined by a pin passing through the five thicknesses. For the lightest work the pieces are arranged two and two. The cables are made of either copper or steel, and vary in strength from a size for a thirty-pound sash to one capable of sustaining a door weighing 1,500 pounds.

There seems to be but one other form of sash-chain at present in the market. It is known as the "Solid Link" chain. It consists of a compound link on much the same principle as the Smith & Egge chain, but made double and with rather finer brass or bronze wire, so that the sash-chain is nearly as flexible as ordinary sash-cord, and can be bent or twisted in all directions without knotting or kinking, a quality which the Smith & Egge chain does not possess. The "Solid Link" chain can even be tied into a knot without kinking. Figure 171 will give an idea of the construction of the link. This form of

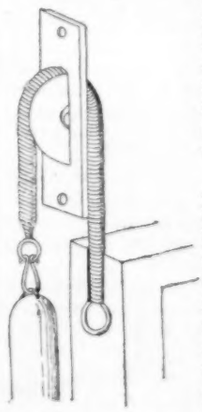

Fig. 172. Acme Sash-cord. Coiled Wire-belting Co.

sash-chain requires no special pulley, but will run over an ordinary grooved-wheel.

An entirely different kind of sash-cord is shown by Figure 172. This consists of a steel wire spring so closely and strongly coiled as to have the resistance necessary to sustain any sash weighing sixty pounds or less. It has a stretching-capacity of only about five per cent. It enables the sash to rest easily and lightly on the pulleys, and enables it to be raised or lowered with half the effort required with rope sash-cord. It is fastened at one end to the sash by an eye or ring, and to the weight in the manner shown by the figure.

The following table gives the average, comparative, retail prices per foot of the various makes and sizes of sash-chains:

TABLE OF SASH-CHAINS. — PRICES IN CENTS.

Description of chain.	For sashes or doors weighing.											
	15 lbs.	30 lbs.	40 lbs.	75 lbs.	100 lbs.	125 lbs.	150 lbs.	200 lbs.	400 lbs.	800 lbs.	1000 lbs.	1500 lbs.
Smith & Egge's plumbers' link, Giant-metal		5	6.5	8		10						
Smith & Egge's plumbers' link, Red-metal	3.5	5	6									
Smith & Egge's plumbers' link, steel	2.5	3.5		5								
Smith & Egge's plumbers' link, steel, black enamelled	3	4		5.5								
Morton's plumbers' link, Champion-metal	3.5	3.5		4.1	4.9	6						
Morton's plumbers' link, steel				3.5	4.1							
Morton's cable-chain, copper		8		7.8	9.6		11.2	13.6	18.4			
Morton's cable-chain, steel				7.2	8		9.6	11.2	13.6	17.6	20	28
Solid link chain[1], brass					14		22					
Solid link chain[1], silver-plated					16		24					
Acme sash-cord	3	4	5	6								

[1] There are but two sizes of solid link chain. They are tested by the makers at 200 lbs. and 300 lbs. before leaving the factory.

[To be continued.]

CANADA

KINGSTON. — MONTREAL. — CANADIAN PACIFIC R. R. DEPOT. — GRAND TRUNK R. R. DEPOT. — ST. ALBAN'S CATHEDRAL, TORONTO. — CHAIR OF ARCHITECTURE. — ST. JAMES'S CATHEDRAL. — PARLIAMENT BUILDINGS. — COMPETITIONS. — CANADIAN ARCHITECT AND BUILDER.

KINGSTON is a pleasant, lively little city of 17,000 inhabitants, situated at the outlet of Lake Ontario—the beginning of the River St. Lawrence—exactly at the angle, thus having an easterly as well as a southerly aspect. Its nickname is the "Limestone City," from its stone, and it is generally considered an "aristocratic" place. Naturally it is a port of some importance; its position and the advantage taken of it for the development of its interests, the substantial and business-like appearance, from the abundant supply of local building stone, all help to make it a thriving place and one which must, as time goes on, greatly increase in size and importance. It is very English and reminds one strikingly of an English country town or small cathedral city; the mixture of the classes of dwellings, frame, brick or stone, all jumbled up together, here and there a church, and a few hotels, one or two of which might correspond with the coaching-houses of sixty years ago, its unpretentious shops and its river — always an accompaniment of a cathedral town — all these would lead an Englishman to expect to see the lofty spires or solid tower of a glorious Gothic pile rising high above all surroundings. But here he would be doomed to disappointment. Although a cathedral city in truth, the Classic structure that does duty for the absent Gothic church is certainly not worthy of the honor of being *the* church of the diocese. However, this is St. George's Cathedral — the Bishop's seat — with a portico of four Doric columns, raised on a flight of half-a-dozen steps, supporting a pediment above which rises a stumpy cupola, with prominent bright green Venetian blinds as louvres. The church was erected some fifty years ago, and some of its details are evidently from some good model: the interior has four fine columns mounted on questionable pedestals, but the moulded bases, the Ionic caps and the entasis of the shafts are decidedly good. Their proportions are lost owing to the hideous yellow-fronted galleries on three sides. The ceiling above a nicely proportioned central cornice is vaulted in lath and plaster, semi-circular with diagonal groins, the nave walls being carried up blank. The church, or rather the nave, has an apsidal termination, also lath and plaster, into which some other barbarian has introduced a large colored window of the usual character of inartistic memorial productions. Happily the congregation with an active rector at their head are alive to their heathenness, and contemplate extensive alterations, with the intention of improving on and enlarging their church and raising the whole tone of the service.

The presence of the military helps to keep Kingston lively; the Military College and the fortifications of the place giving it a warlike look. The Government recognizing the importance of Kingston as a port is allowing grants of money for the construction of a dry-dock and other additions to its facilities for business.

The great buildings of Montreal are rapidly progressing, efforts being made in each case to get as much done as possible before the settling down of the cold weather. The winter in Montreal is certainly no joke to the building trade: the first snow always falls in October and the last usually in April. It is not till the 14th of June sometimes that the new bricks are ready for sending out. Brick dwellings have been erected there all through the winter and in very severe ones, too, without any apparent harm, and really unless this is done, the "building season" is reduced to four or five months. This year the first snow-fall was early and great. Five and eight-tenths inches was registered on October 9, and it is said that so severe a fall has not been known for the last twenty-six years. Six inches were recorded October 26, 1862. I have measured 3″ and 4″ falls within the last few years for the first of the season.

The immense pile of buildings forming the new Canadian Pacific Railway depot is to be completed and inhabited this month (November). The cost of this building is in the neighborhood of two million dollars, which includes the railway station. This is the West-end depot, the acquiring properties for which and its approaches have footed up a long way into the seven figures. It has been a tremendous undertaking but the whole thing has been done within the last eighteen months or so. Negotiations for the appropriation of land for the other end of the line, its new entrance into Toronto, are proceeding and are almost completed. What with new bridges, particularly the one over the St. Lawrence at Lachine mentioned in a former letter, the pecuniary outlay has been simply enormous during the last two years.

The new station for the Grand Trunk Railway is nearly completed, and this, while its remains clean and new-looking, will redeem in a measure the disagreeable qualification of general and thorough dirtiness applicable to all the stations of this line in Canada. The Union Station in Toronto is every bit as bad as other small stations, begrimed with smoke and train oil.

St. Alban's Cathedral, Toronto, is a great undertaking, the completion of which is not expected to take place for generations to come. It was set on foot by the Bishop of Ontario and some other influential members of the Church of England who were not satisfied with the low-church service conducted in St. James's Cathedral. Subscriptions were raised and a site purchased a very long way from everywhere. Further money was subscribed and a see-house erected and then designs for the new cathedral were wanted. A competition was suggested but the committee were told, rightly enough, that unless some kind of bonus was to be granted, the best men would not compete. Then the question was "What individual architects will take the matter up?" All the money that could be procured was needed for the building and the committee would pay nothing for designs. They received an offer, however, from a Toronto architect who supplied a design gratis and agreed to be satisfied with a fee for his visits of supervision. The chancel was started and is in progress and it is hoped the roof will be added soon. A large perspective view taken from the northwest angle has been published and, for the sake of the credit of the committee and all concerned, it is fortunate that it is not to be carried out yet, so there will be time for them to change their minds and do something towards obtaining something good and correct. Here is to be a great cathedral, a quarter of a million is to be expended upon it and the promoters of the scheme are in such a hurry to get the building begun that they will not wait till they can afford to get a design in even a decent manner but take the first design offered to them, gratis, without raising a question as to whether the design is good, bad or indifferent. One would think, judging from the design, that the architect had never designed so high a tower in his life before and it has the appearance of being piled up story upon story until it was about time to put pinacles on; there is no unity or homogeneity, and all is as crude and poor as it can well be, that is the southwest tower; the northwest tower ends in a spire, finikin and weak, and looks uncommonly like a second-hand spire, originally designed for an Evangelical meeting-house. It has apparently happened to be the same size at its base externally as the tower is at its summit inside the parapet, and the one is fitted down into the other squat and out of

all proportion. The whole design lacks originality and has been unfavorably criticised in every direction. The promoters of the scheme have themselves hesitated, but they have come to the determination to complete the chancel sufficiently at any rate to enable them to hold service there, and as they are, under the existing arrangement with their architect, bound to nothing, intend to leave the nave and other parts to look after themselves. Probably by the time money is subscribed for the nave the grandchildren of these good men may like to have another design, for it is pretty certain this generation will see no nave.

It is sincerely to be hoped that the Minister of Education will be able to carry out his scheme of founding a Chair of Architecture. Of course, it is to be presumed that before doing so he will consider well the best way of making it suitable to the needs of the Province. We want something to be done which will not merely educate students but which will turn the attention of the already educated to what is true architecture. We have, as it is, far too many exponents of what is *not* true architecture and examples everywhere of the appearance of false art or rather that which is not art at all. Let him take the advice of those who are trained in the art, else it is to be greatly feared he will do more harm than good.

The alterations to St. James's Cathedral, carried out at a cost of $40,000, are progressing slowly and now that the building is dismantled it is disheartening to see the "shams" that have been resorted too in its construction—false effects produced by means of paint and plaster. The pillars of the nave have a stone core but the shafts attached to the four faces, the moulded caps and bases are all wood painted the color of the stone. Voussoirs of nave arches, the heavy cornice at the eaves, the dark panelled ceiling, of wood to all appearance, are all of plaster; cheap and effective but utterly false, in a place where above all other places, the work should be honest and true. This was executed some years ago: it is to be hoped, and no doubt it is a fact, that the architects engaged in the alterations now know better and have principles above such shamming. It is just as easy to decorate in color as to paint one material to represent a better one and we have none too much color in the materials at hand as it is. It is to be regretted that color decoration as a part of the architecture has become a secondary consideration not to be thought of except in special cases. Now that it is so conclusively proved that color decoration has been used for every style of architecture at all dates and by all peoples from the rudest tribes to the most highly cultivated nations, to omit color from a finished building is like omitting half the effect. But to color without regard to the correct shades and patterns is as bad as coloring stone to represent wood or galvanized-iron to look like stone.

The Parliament Buildings are slowly rising but they will hardly be above the first-floor level this autumn. A very large body of men is being employed but the building extends over so large an area that to the uninitiated it seems to go on very slowly. There was a good deal of trouble about the settlement of the competition for this building which took place several years ago. It was supposed to have been decided and one firm of architects appear to have counted on this supposition and believed their design was chosen. It was rumored that an action was to be taken out against the Government for the amount of the commission but apparently nothing has been done yet. The proceedings were certainly questionable, though had the matter been ventilated the ugly rumors afloat might have been proved groundless; but the fact that the professional referee is carrying out the building and not one of the competitors looks peculiar, no explanation being offered to the competitors. All the designs sent in were returned, the referee finding grave faults in each. It is one of those matters which it would have been better for all parties concerned to have cleared up. It certainly is time that concerted action should be taken in the matter of architectural competitions by architects of standing: it must be concerted and it must be general. If men, however, will enter into competitions without sufficient guaranty of the fairness of the awards, they must take their chance. So far, general competitions have proved for the greater part unsatisfactory, and those who have had much to do with them know very well that with the best conducted there is always more than a chance that the sealed-envelope plan will not be rigidly adhered to to the end. It still remains to be seen what will be the result of the Competition for the Board of Trade Building, in Toronto: the feeling expressed by the daily press is very strong against the appointment of an American architect. President Cleveland's desire for "Retaliation" has awakened in the breasts of the Canadians in general a desire to show that "two can play at that game." The Board of Trade made a great mistake in not limiting the competition to architects in Canada; but the intention at the outset was that the competition should be an entirely fair one and it is to be hoped it will be to the end. Nothing had been heard or made public by the end of last month as to the progress that Professor Ware had made with the designs under his charge. I hear incidentally that sixty applications for particulars of the competition were received by the secretary.

The new paper, *The Canadian Architect and Builder*, is filling a long-felt want of intercommunication between architects, builders and manufacturers in the Dominion. It seems to have set out in a right direction and gives local items of a character consistent with the objects of the paper in a concise form, though some of the correspondents are apt to be rather too "local" in news they forward. It takes up the matter of "importing designs" for buildings very strongly. It gives an epitome of all the building news of the country, and has been taken up by the "Toronto Architectural Guild" who at a recent meeting passed a resolution expressing interest in its success, so that it may fairly be considered an authentic dispenser of professional news. It gives one large illustration monthly; this month it is the design for the Toronto Court-House and City-Hall, that has been written about in former letters, the building which should be historical, as among architectural competitions, because of the peculiar management of the whole business. I would only say that a building for $200,000 was competed for, and all designs thrown out because it was supposed none could be carried out for the sum named. The design now to be carried out is to cost over $1,250,000.

Another subject that requires united action on the part of architects, is remuneration for professional services. Five per cent is certainly too much for some classes of buildings, as it is as certainly far too little for others. It is very good pay for factories and warehouses where there is no special amount of art or science required; but for the higher class of houses, for which the best and newest articles in fittings are required and decorative works introduced, it does not pay; and, when the work to be paid for at that rate is for heavy and extensive alterations and additions that often take far more time and trouble than a new building, an architect ought to be able to secure an amount that will pay him. If, as seems to be the case, five per cent is a recognized and sufficiently remunerative amount for the last five and twenty or thirty years, the character of the work an architect is now called upon to do for the same sum has materially altered, and both in construction and design a far greater amount of attention has to be given, deserving a proportionate increase in the amount of remuneration; at present but few can command higher pay, and fewer are ready to pay it. Architecture at present is a poorly paid profession, but the real comfort of living depends as much on a good architect as upon anything else. "Is life worth living?" Not if your house has been carried out by an ignorant architect. To obtain good quality a good price should be given, and as the quality provided by a great many is undoubtedly good, it should be paid for accordingly.

ILLUSTRATIONS

[Contributors are requested to send with their drawings full and adequate descriptions of the buildings, including a statement of cost.]

DOORWAY TO HOUSE OF E. P. BRADBURY, ESQ., MARLBOROUGH ST., BOSTON, MASS. MR. W. WHITNEY LEWIS, ARCHITECT, BOSTON, MASS.

[Helio-chrome, issued only with the Imperial Edition.]

GOTHIC TOWERS AND SPIRES, PLATES 31, 32 AND 33.—ST. CUTHBERT'S, WELLS; ST. JOHN THE BAPTIST, KEYSTONE; ST. ANDREW'S, EWERLY; ST. ANDREW'S, HECKINGTON; ST. MARY MAGDALENE'S, WARBOYS.

[Issued only with the Imperial Edition.]

THE FIRST NATIONAL BANK, CINCINNATI, O. MR. JAMES W. McLAUGHLIN, ARCHITECT, CINCINNATI, O.

THIS building which has just been completed, occupies a lot 55 feet on Third Street by 75 feet on Walnut Street. The lower story or basement is of Missouri granite, the remainder of the exterior being built of Obsidian brick, of a dark chocolate color, trimmed with Iowa red sandstone. The building is 100 feet high to the top of the parapet. The ceiling of the banking-room on main floor being 22′ 6″ in the clear. The entrance-hall is wainscoted with marble and the interior finish is of quartered oak. The structure is entirely fireproof, iron-beams and fire-clay arches being used throughout, and columns and girders protected with porous terra-cotta and finished with Keene's cement. The roof is of Neuchatel asphalt laid on hollow fire-clay slabs fitted between the iron T-s. The staircases are of iron, the railings being treated with the Bower-Barff process, and having treads of red marble. All halls and the public space in bank are tiled with marble.

OFFICE-BUILDING, MINNEAPOLIS, MINN. MR. L. S. BUFFINGTON, ARCHITECT, MINNEAPOLIS, MINN.

DESIGN FOR A LODGE. MR. F. L. V. HOPPIN, ARCHITECT, PROVIDENCE, R. I.

DESIGN FOR LADIES' DORMITORY, WELLS COLLEGE, AURORA, N. Y. MR. W. H. MILLER, ARCHITECT, ITHACA, N. Y.

BAPTIST CHURCH, SANFORD, ME. MESSRS. STEVENS & COBB, ARCHITECTS, PORTLAND, ME.

HOUSE ON LOCUST ST, WALNUT HILLS, CINCINNATI, O. MR. S. E. DES JARDINS, ARCHITECT, CINCINNATI, O.

CHURCH OF THE MESSIAH, BROOKLYN, N. Y. MR. R. H. ROBERTSON, ARCHITECT, NEW YORK, N. Y.

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·First·National·Bank·Building·

·Cincinnati·Ohio·

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OFFICE BUILDING. [IRON CONSTRUCTION]
MINNEAPOLIS, MINN.

L·S·BUFFINGTON ARCHITECT
MINNEAPOLIS MINN · Æ · 1888

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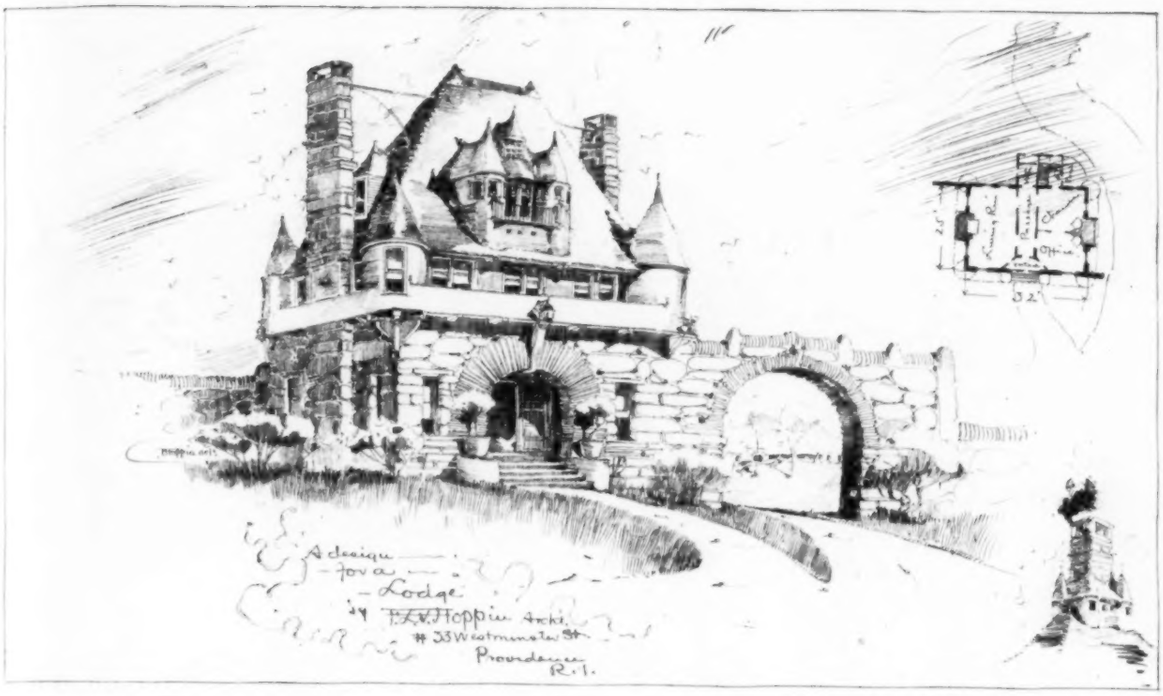
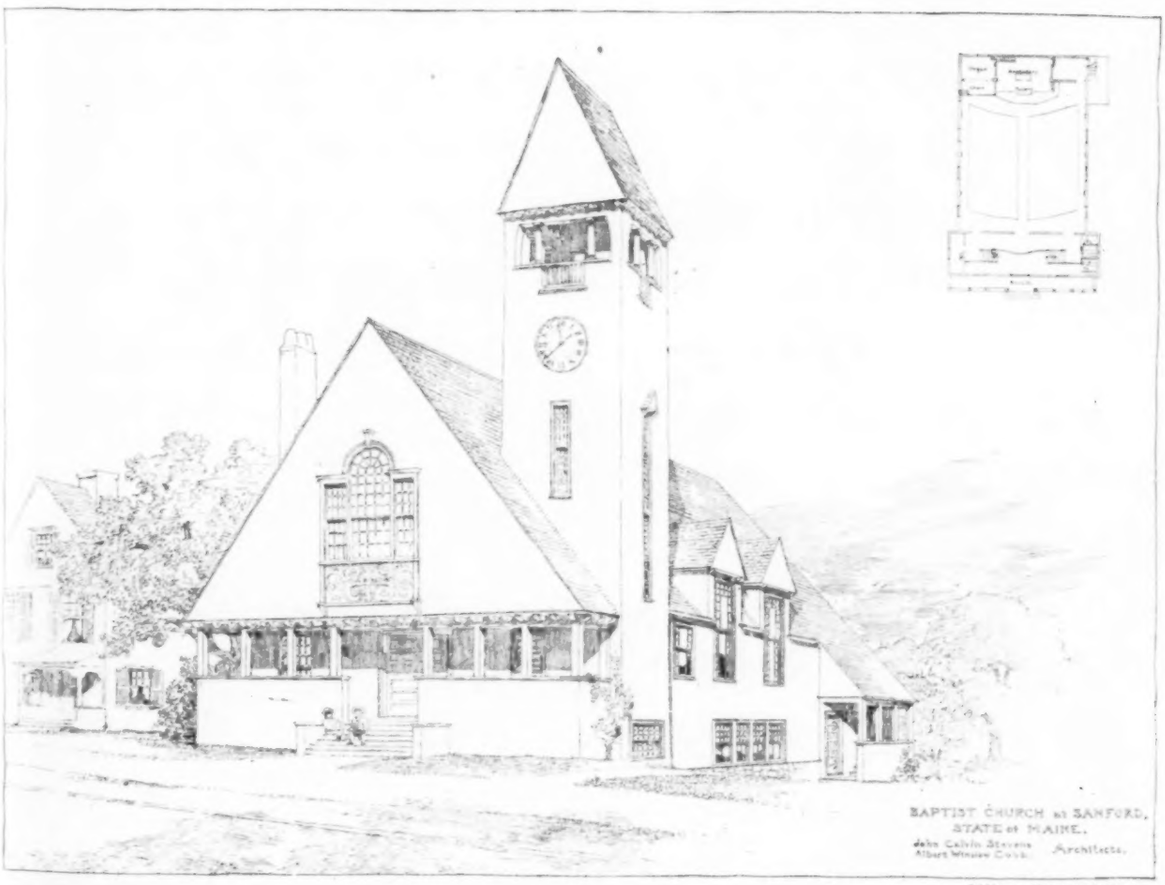


A design for a Lodge
for F. W. Hoppin Esqr.
33 Westminster St.
Providence R.I.



BAPTIST CHURCH at SANFORD, STATE of MAINE.
John Calvin Stevens
Albert Winslow Cobb
Architects.

Heliotype Printing Co. Boston.

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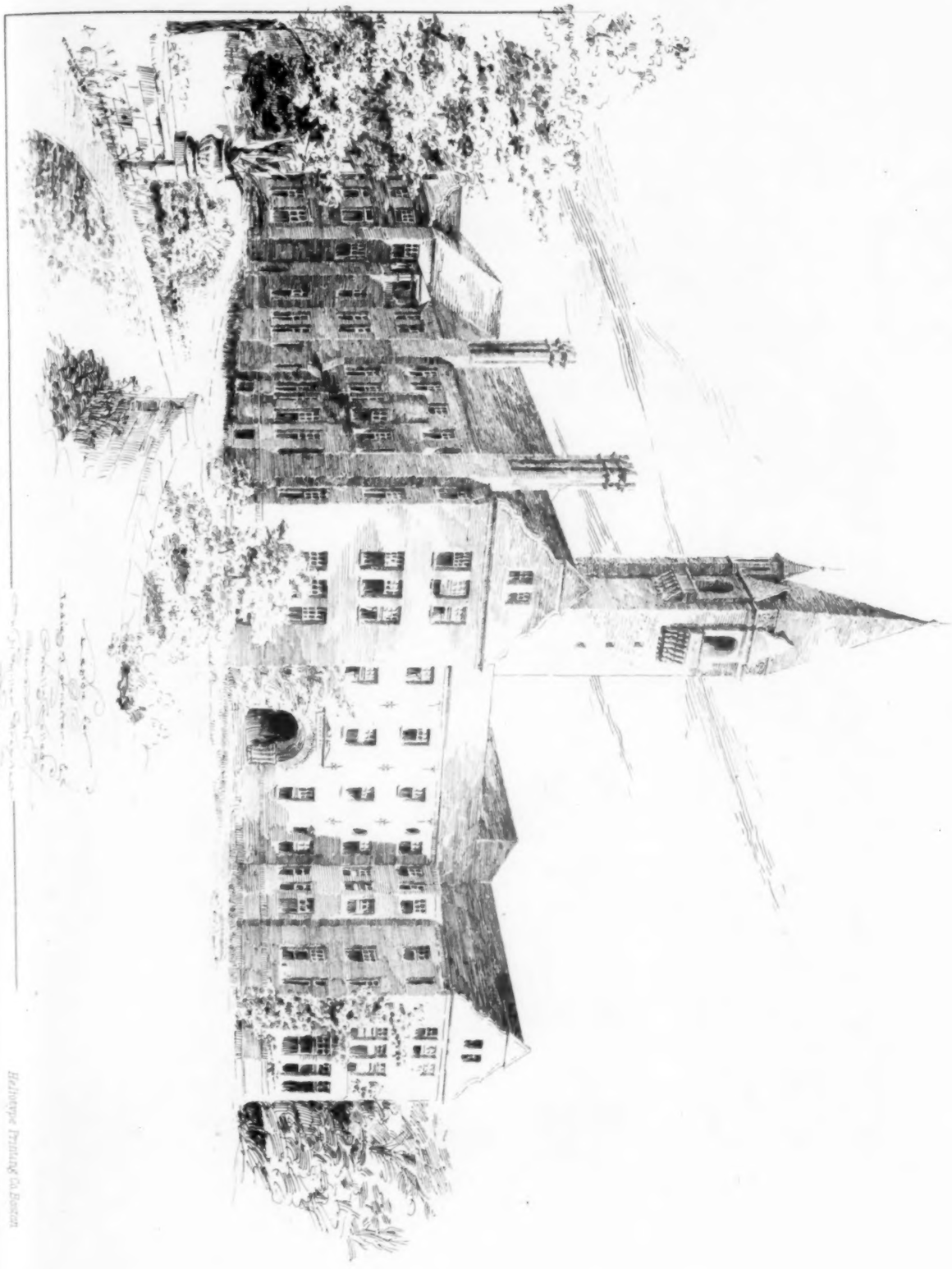

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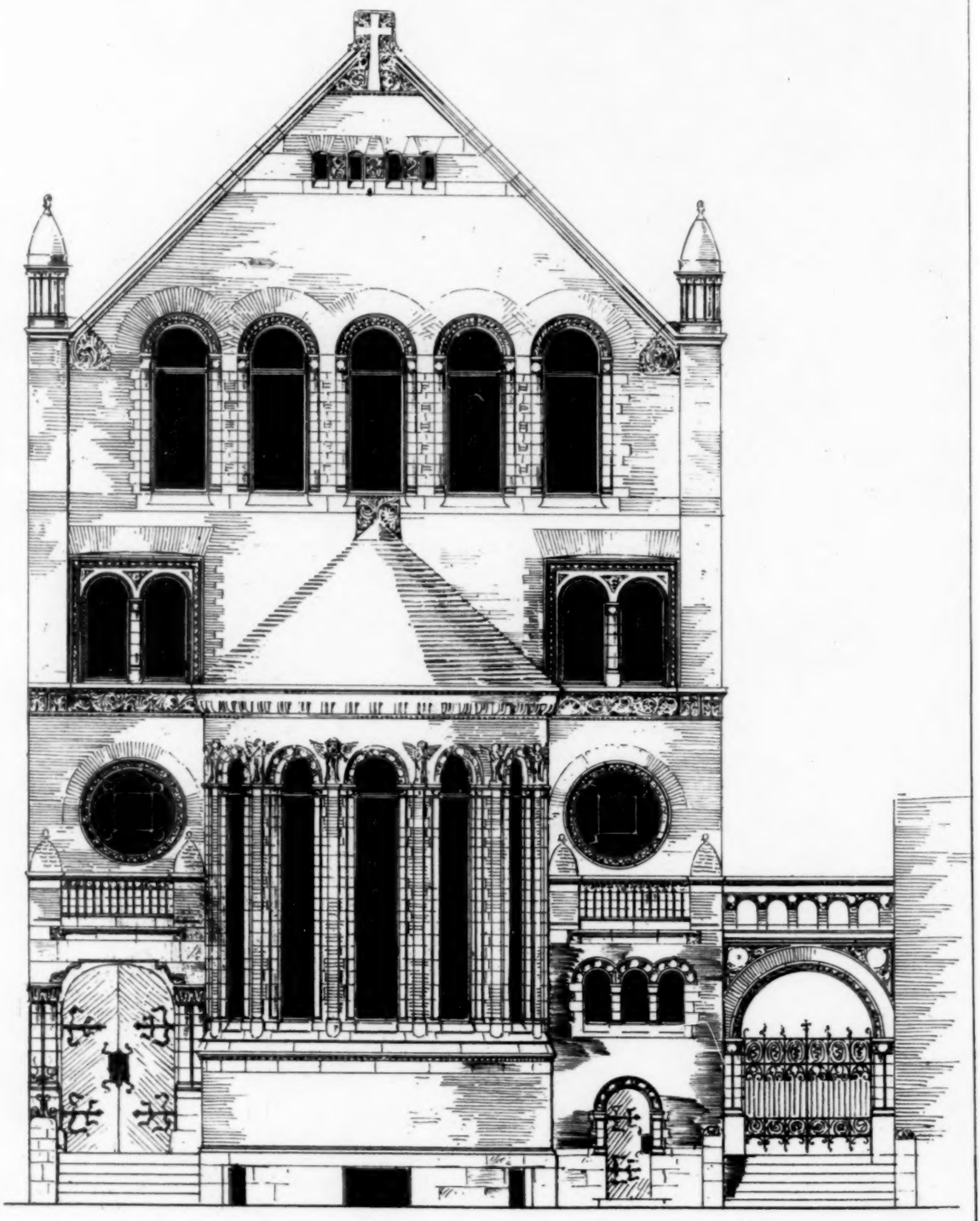
CHURCH OF THE MESSIAH
BROOKLYN N.Y.



Elevation On Greene Ave.

R.H.Robertson. Architect

Heliotype Printing Co. Boston.

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HOUSES on LOCUST STREET,
Walnut Hills, Cincinnati, Ohio.

S.E. Do, Architect.

Halbertype Printing & Boston.

LONDON

THE ASSOCIATION CONVERSAZIONE. — IMPROVEMENT IN DRAUGHTSMANSHIP. — THE ARTS AND CRAFTS EXHIBITION. — STAINED-GLASS. — THE NEW THAMES TUNNEL. — DEATH OF JAMES SELLARS, ARCHITECT.

LONDON, October 12, 1888.

I SUPPOSE architecture — like everything else — must have its season of rest. At all events, such has been the case here in England, during the past two or three months. Society has taken itself wings and flown away. The picture-galleries have closed their doors. The Institute of Architects has been given over to the tender care of the painters and decorators. The merry laugh and head of the student is sought for in vain at the Association. The very newspapers are at their wit's end to fill their columns with readable matter. All is silent, dismal and dull. But, with the advent of October, come brighter days. There is already a movement visible among the dry bones, and before the month is ended everything will be progressing as merrily as ever.

One of the signs of this returning life is the opening conversazione of the Association which took place on Friday last, at Westminster Town-hall; and the occasion this year was a somewhat interesting one, inasmuch as an agitation has been proceeding among the students in favor of a dance, on a large and extensive scale, being substituted for the frigid, stately reception which generally takes place at these meetings. The Committee of the Association were, however, quite proof against such frivolous suggestions, and the usual reception was, therefore, held. Perhaps it was a degree more frigid, a degree more stately than usual. But, what matter! The dignity of the Association was duly maintained, and English architects may yet thank God that they are not as other men are.

By far the most interesting part of the evening's entertainment was the exhibition of students' drawings, and it was simply marvellous to see the perfection to which draughtsmanship is carried nowadays. Indeed, unless a man is not only of first-class abilities, but also content to plod on night after night, long past midnight, he can never hope to achieve much distinction in the academical field. The successful competitor for the silver medal of the Association, Mr. B. F. Fletcher, son of Mr. Banister Fletcher, tells me that he has had practically to devote the whole of the long vacation to his work, and has postponed his holiday week after week till far on in September, when the short days and cold weather deprive them of half their pleasure, and altogether prevent sketching. Another student whom I know, in his determination to get the prize of a certain class, worked on through the winter, sometimes to two or three o'clock in the morning, and, for once for a whole fortnight, cutting his sleep down to four or five hours a night. The consequence was he became very ill. I might give you other instances, but these will suffice as examples to show you what evils this system of intense competition is producing, and it is a little difficult, at the moment, to prescribe a remedy. If men are prepared to sacrifice anything rather than be beaten in a struggle, how are they to be prevented?

Another sign of life is the Arts and Crafts Exhibition which has just been opened at the new gallery, Regent Street. This is the rather ambiguous title of a most excellent exhibition, based on the following idea: It is a well-known fact that in the various handicrafts, the purchaser of an article rarely comes in contact with its designer, rarely ever knows his name. The connecting-link between the two is the proprietary manufacturer or middleman, and as it is to his interest to keep the artist in his employ as unknown as possible, there is very little chance of recognition for really artistic power. We can recognize a painting as the work of a certain painter, and give him credit for his work, but, as regards the crafts, it is altogether different. Here the artists are very often poor, struggling men, without capital and destitute of the means to make their own productions known to the world. The result of this state of affairs — which is only the natural outcome of a refined civilization — is greatly to be deplored. The manufacturer has generally only one object, viz., that of making money, and, indeed, his connection with the arts is only for that end. To attain this object, he aims at producing articles which shall attract the masses. His one idea is to produce a good first impression, and whether the design is pure in its conception, or whether it is executed in a truly artistic spirit, is a matter of indifference to him, so long as sensational effects are produced, the uneducated taste of the general public satisfied and his own pockets well filled.

Is it, then, any wonder that under these circumstances the original skill of the designer becomes stifled, ground out of him, and he, feeling that his efforts to throw a little artistic feeling into his design are worse than thrown away, sinks to the unenviable position of the producer of those dull, lifeless objects that we see in the ordinary shop-window.

This is the state of affairs that this Arts and Crafts Exhibition Society is trying to alter, and it is for this purpose that this exhibition has been inaugurated. The principal subjects which are illustrated by exhibits, are: 1, textiles; 2, decorative painting and design; 3, wall-papers; 4, fictiles; 5, metal-work; 6, stone and wood-carving; 7, furniture; 8, stained-glass; 9, table-glass; 10, book-binding, and 11, printing. A perusal of this list will show at once the comprehensive character of the exhibition; indeed, to my mind, the Executive Committee has been a little too ambitious, since they are not able with the limited space at their command to quite fairly represent these various handicrafts. Short prefaces upon each subject by such masters of the arts as Walter Crane, J. J. Cobden-Sanderson, Somers Clarke and others are added to the catalogue, and, I believe, it is the intention of the Committee to arrange for lectures on the various subjects to be delivered during the progress of the exhibition.

I have not space here to notice the exhibits in detail, indeed, I think a few general remarks on the exhibition would be of more interest to you than a dry detailed critique.

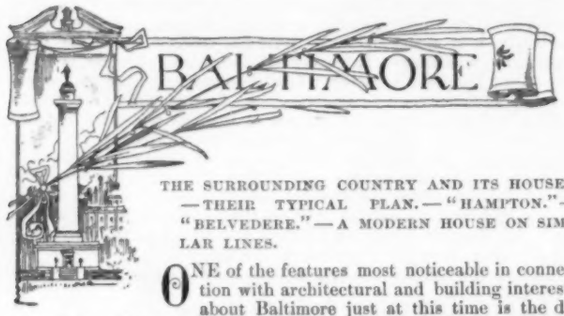
The first thing one notices is the difference, the extraordinary difference, between the exhibits and the ordinary show articles in the shop-windows. One has been done for the love of the thing, the other to sell, one is full of artistic interest, the other is mechanical, lifeless. Another point which is very apparent, is the wonderful advance that has been made in these arts during the last five-and-twenty years. Take, for instance, wall-papers, and compare the beautiful and delicate combinations of form and color that are in use in our best houses at the present day, with the fearful and horrible productions of a quarter of a century ago. Indeed, the advance of wall-paper in artistic merit during the past decade, is very remarkable, and reflects all honor on those who are responsible for their productions. Stained-glass, too, is another subject which has lately shown great life and spirit, thanks mainly to such masters of the art as Mr. Burne-Jones. Mr. Somers Clarke, in his preface upon stained-glass, waxes very indignant with the producers of painted-windows. He stigmatizes Munich glass as "transparencies no better than painted-blinds," and states that "at the best the painted-window becomes an indifferent picture badly placed" — I am afraid Mr. Clarke has permitted his feelings to run away with him, and, although I agree with him in his statement that the stained-glass window "must play its part in the adornment of the building in which it is placed," yet, it by no means follows that "it is not an object to be looked at by itself." I cannot see that a stained-glass window is merely a feeble attempt at a picture. It is the product of an art in itself and should be criticised on its own merits, and not from the picture-painter's point of view.

Some most admirable examples of figure-work, cartoons of a large size, are exhibited by Mr. Burne-Jones, notably a figure of St. Michael, which forms part of a mosaic for the decoration of the apse of the American Church of St. Paul, at Rome. The whole scheme is extremely interesting, but the figure I have alluded to, in its vigor of form and expression, is extremely good.

For the last year or two, a work of some importance has been taking place in the City of London. I refer to the new tunnel which is being driven under the Thames, near London Bridge, to accommodate an underground railway, connecting the city with Brixton and the other southwestern suburbs. The City station is situated close to the monument erected in 1671–77, to commemorate the Fire of London, and a few days ago, a large block of stone from the top of the monument gave way and narrowly escaped injuring several people. The city authorities have taken steps to investigate its condition, and it is not yet known whether the underground works of this railway have been instrumental in causing the damage. At any rate, there has been a very serious subsidence on the other side of the road which will involve, I expect, the demolition of several shops.

I regret to have to inform you that I heard last night of the comparatively sudden death of the eminent Glasgow architect, Mr. James Sellars, who has, as you doubtless know, done some very excellent work in that northern city, and was the architect to the Glasgow Exhibition Buildings.

ROUBILLIAC THE SCULPTOR.— Roubilliac was a native of Lyons, where he was brought up to the trade of stonecutting. Showing considerable taste as well as skill, he devoted himself to the ornamental branch of his craft. Hearing that there would be larger scope for the exercise of his skill in England, he came to London, and was employed by a builder for the ornamental part of the work. One evening he found a purse with gold, and containing the address of the owner, Edward Walpole, Esq., to whom he restored it. Mr. Walpole was touched by the honesty of the workman, and asked him about his occupation. Having made further inquiry, Mr. Walpole got him into the studio of Cheer, a noted sculptor of that day, and he always afterwards patronized the French artist. Having set up for himself as a statuary in St. Martin's-Lane, the first work of public interest from the chisel of Roubilliac was a statue of Handel, from a single block of fine white marble. This was purchased by Mr. Tyers, the manager of Vauxhall Gardens, where it was erected, and attracted much notice. It is now in the possession of the Sacred Harmonic Society. This was the beginning of his celebrity. It is remarkable that the latest work from his chisel was the statue of Handel in Westminster Abbey. To have produced the best statues of Handel and of Shakespeare may well entitle Roubilliac to the high place he holds in the records of art. — *Leisure Hour.*

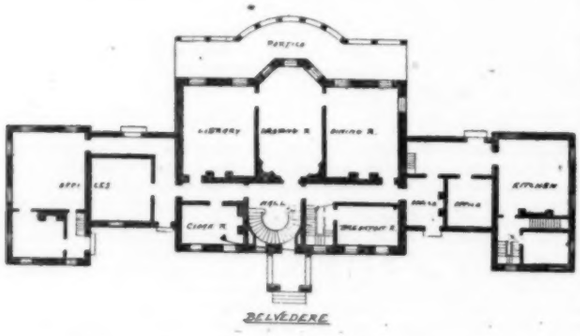


THE SURROUNDING COUNTRY AND ITS HOUSES. — THEIR TYPICAL PLAN. — "HAMPTON." — "BELVEDERE." — A MODERN HOUSE ON SIMILAR LINES.

One of the features most noticeable in connection with architectural and building interests about Baltimore just at this time is the development within the last decade of suburban improvements, particularly in regard to dwelling-houses and all the relations of home life, a development that is chiefly interesting not so much from its extent but because there is in it a very distinct element of change, not only a progress, but a transition from an old style of design, from an old form of life to a new; a change whose causes are perfectly recognizable and natural, and which becomes more strongly marked year by year.

With a climate whose midsummer is never too warm for health, or even for all the enjoyments of country life, producing a foliage the same in kind and as freshly green as that of New England, but whose greater luxury of growth tells us we are on the border lands of "the South," the natural beauty of the country surrounding Baltimore, particularly to the north and west, is singularly attractive in its general aspects of quiet interest. Elevated and rolling, from the higher points we obtain an extended view over the luxuriously wooded valleys and hills — with here and there the roof and towers of some prominent building showing above the trees — down to the distant city itself, half hid under the hills, and dim behind its hazy cloud of smoke and mist; while, beyond all, the bright waters of the Chesapeake Bay glisten in the sun. Our forefathers seem to have fully appreciated these advantages, and we find scattered through the surrounding country many houses built from seventy-five to a hundred years or more ago, some of the earlier ones being conspicuous as centres of social life when Baltimore itself was still a small town. An aspect of refinement and elegance — in some cases, of actual stateliness — and the suggestion of a rather lavish mode of living, characterize these houses, which were designed upon a certain typical plan — seldom seen in later buildings — thoroughly in harmony with the natural surroundings, and with the habits and customs of an age very different from our own of to-day — an age when slavery existed, when the life of a man of wealth and of high social position was much more one of careless ease and idleness, and more distinctly separated from that of his less fortunate neighbors than is possible in the neighborhood of a large city under the social conditions of the latter part of the nineteenth century.

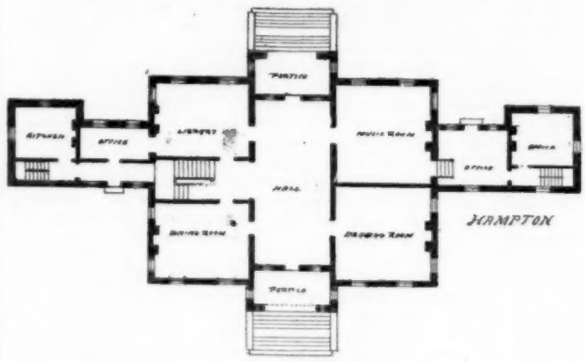
The typical plan of these old houses was based upon an idea of proportion, symmetry, and simplicity; no economy of space was necessary, and the exterior effects were usually inspired by the so-called "classic revival" that was then the ruling spirit in nearly all English domestic architecture, and naturally extended its influence to America, where social customs, particularly in Maryland, were still closely modelled after those of the mother country. But, unfortunately, as the English was in many respects only an imitation of the classic Italian, so the American became often — not always — only a weaker imitation of the English, and sham masonry of wood and plaster too frequently took the place of marble, stone, and brick.



BELVEDERE

The general scheme usually comprised a large central building of two or three stories' height, containing a wide hall with large, square rooms opening upon it, and a main staircase, and with porticos of more or less stately proportions at either end. On either side of this large central building extended long, low wings, of only one or two stories, and symmetrically arranged for the exterior effect, — one containing the kitchen and various rooms for domestic purposes, the other a library, billiard-room, or business office of some kind. We note in the interior arrangement little thought of concentration or economy in the details of stairways, passages, etc., a great paucity of closets, and a total absence of the modern "buttery." The various parts of the group of buildings were roofed with simple gables or hips; the windows and doors were only symmetrically arranged openings in the walls, ornamented, if at all, only with some refined, carved mouldings around the frame, and the universal outside Venetian blind; while the towers and turrets and bay-windows of more modern times, in all their innumerable fantastic forms and unexpected places, were unknown.

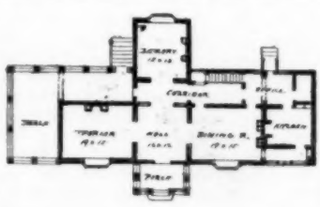
Such is the type, in a modified form, of "Mt. Vernon" and of the majority of old Virginia mansions, now rapidly falling to ruin, but still proudly boasting of their ante-bellum splendors, when even the sun and the stars shone with a greater glory over the "Old Dominion" than in these degenerate days. In Maryland a few have been entirely destroyed to make room for a new architectural generation, and the old ones still standing have suffered chiefly from the ill-advised and incongruous touch of modern alterations and improvements. The most important, probably, were "Hampton," the seat of the Ridgelys, "Belvedere," of the Howards, "Doughoregan Manor," of the Carrolls, and "Wye House," on the "Eastern Shore," the



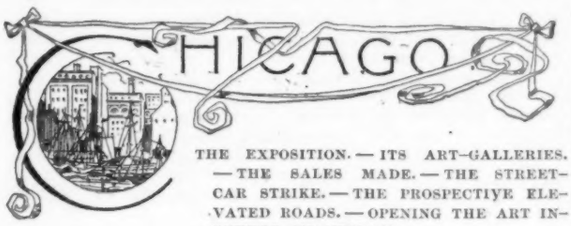
HAMPTON

home of the Lloyds, this last of frame, the others of brick and stucco. Three of these houses are still in excellent preservation, and still owned and inhabited by the families whose ancestors built them. We give sketch-plans of "Hampton" and "Belvedere," the former situated about nine miles from Baltimore, and built in 1783 — and in Downing's "*Rural Architecture*," the edition of 1859, he thus speaks of it: "It has been truly said of 'Hampton' that it expresses more grandeur than any other place in America. It belongs to the stately order of places unknown here at the north. . . . The façade of the house is one hundred and eighty feet in length, with offices attached, erected soon after the Revolution. The entrance-hall, of great width and dignity, passes the visitor to the south front, where is a terraced garden of great antiquity, with clipped cedar hedges of most venerable appearance. The formal terraces of exquisitely kept grass, the long rows of superb lemon and orange trees, with the adjacent orangerie and the foreign air of the house, quite disturb one's ideas of republican America."

Of "Belvedere," alas! not one stone remains upon another — the very ground upon which it stood has disappeared — levelled to the grade of the encroaching city's streets some dozen years ago, and what was once far below the lowest depths of its vaults, is now the bed of North Calvert Street, where all that survives to recall what once stood above it is the classic name of "Belvedere Terrace." This type of house is built no more, and as it was the result of conditions that will never exist in the future, it will probably never be built again. Maryland may be said to have changed her geographical position, as though the old "Mason & Dixon" line had moved down from the Susquehanna to the Potomac, and swept with it many of the details of practical life which had long obtained on her soil, leaving the voids to be filled by a rapid influx of ideas and practices that had already been adopted with more or less care and deliberation by her more northern neighbors; but these were sometimes found not to fit the new condition of things in the border State without a certain amount of readjustment and adaptation. The houses needed to be smaller and more compact, and, except for persons of more than average wealth, not only to cost less in construction, but to be less expensive to live in and keep in order; to be well heated and to have sunshine in the principal rooms for winter comfort, and at the same time to be adapted to four or five months of open-air summer life, when wide doors and the protecting shades of deep porches is important; and in all cases rooms not too small for large pieces of furniture were a desideratum. The Eastlake and Queen Anne Villa, even in its most attractive form, has fulfilled its mission and has had its day, and is still having its waning twilight,



dying hard under the hands of the progressive property-agent and the intelligent carpenter. Its unlimited possibilities of being thrown together in all conceivable irregularities and eccentricities was too destructive of æsthetic repose, and its concentration of plan too unsuitable to the climate, to find lasting favor with the more thoughtful of the community. The architects have lately awakened to the fact that what is needed are moderate dimensions, and simplicity and symmetry of plan and elevation, combined with the refinement of classical or colonial details. The accompanying plan (made on about the same scale as those of "Hampton" and "Belvedere") is of a recently erected house on the outskirts of Baltimore, which, among others, is an attempt to carry out this scheme. Its outline will suggest not only the house as it is actually constructed, but several possible elevations, in frame or masonry, developing the idea of simplicity and balance of proportions.



THE EXPOSITION. — ITS ART-GALLERIES. — THE SALES MADE. — THE STREET-CAR STRIKE. — THE PROSPECTIVE ELEVATED ROADS. — OPENING THE ART INSTITUTE ON SUNDAY.

ALTHOUGH probably unknown to the general public who live more than a couple of hundred miles away from here, every twelve months there takes place a display of Chicago life and activity that is commonly spoken of as "The Exposition." Actually, it has some quite lengthy official name, but to the populace at large and to the great unwashed it is only known by the above title. This exhibition takes place in the fall, and continues during the greater part of the months of September and October. In the main, it is an exhibit of manufactures, manufactured products, and fancy displays by the principal merchants of the city. The omnipresent folding-bed, the parlor-organ and the family sewing-machine jostle the terra-cotta exhibit and the display of sidewalk vault-lights: a flourishing popcorn business is not in the least disturbed by an exhibit of brick-making machinery on one side, and a corset factory on the other, while, in the midst of all, a band dispenses music upon the just and the unjust. As a matter of course, in its main features, the exhibition is, year after year, much the same, being, as it is, an exhibit of the thousand and one industries, both great and small, that centre in and around Chicago. Still there is always one department, and that of the fine arts, that is different and is always crowded with visitors.

The twenty odd railroads coming into the city make the exhibition a pretext for selling half-rate tickets at this season of the year, and the result is that, in the aggregate, a really immense number of people visit Chicago either on business or pleasure, and always take at least a peep at the Exposition. Consequently, no exhibit in the West begins to have the same direct art influence over the great mass of people as does this display. At the Art Institute, the duration of the exhibit is ordinarily short, and, unless there be some very extraordinary attraction, the visitors are chiefly from the city or immediate suburbs; while at the Exposition the vast majority are people from out of town, who rarely see any exhibition of any artistic excellence; and all this renders the exhibits of the Exposition more far-reaching for art education than anything in this portion of the country. No commissions being charged on the sale of pictures, added to the care that is taken of the canvasses, make this exhibition a favorite with artists, even if the fact that, ordinarily, more pictures are disposed of here than at any other display in the United States would not of itself make it desirable to send pictures.

Thus the committee find their task comparatively easy, and almost always, at least, fairly successful. This year, the number of exhibits shown in the catalogue was over four hundred and fifty. Several of the walls nearly appeared as if this year's Paris *salon* had been transported bodily. On one of the walls, at least ten of the pictures had figured there, while the total number that had been exhibited there either this year or previously must have been nearly one hundred. One of the extremely curious and interesting features of the picture-gallery was a series of paintings (which have been already exhibited in several cities) illustrative of Japanese life and surroundings. This collection, though rarely portraying subjects in a manner especially calculated for a picture-gallery, was still peculiarly enjoyable to architectural students, as showing Japanese architecture, with its accompanying bright-colored landscapes and brilliant flowers. As usual, the daily papers had column upon column devoted to a more or less intelligent criticism of the art-gallery; but, suffice it to say, that the exhibit, while containing no very extraordinary pictures, has been generally very greatly admired for the good and high average standard of the work. Among the purchasers of paintings is mentioned the Detroit Art Museum, and, as the total sales are stated to have exceeded $16,000, the artists cannot complain greatly of not being appreciated.

During the past month two parts of the city have been more or less disturbed by a strike on the street-car lines directed against the Philadelphia syndicate that owns two-thirds of the street-car system. For several days all traffic was stopped on the West Side, and for over a week the people of the North Division were obliged to limber out their aristocratic legs, or have recourse to all sorts of ante-diluvian conveyance that no one imagined yet hung together.

Naturally, business of certain kinds was seriously interfered with; police detachments were flying hither and thither in patrol-wagons, while the few cars run were loaded principally with policemen. No riot of any real importance took place, but conflicts with the strikers were numerous, and the city for nearly two weeks, if not at the mercy of gangs of lawless men, was certainly not far from it.

At length "the union" was forced to give in, which it did with the worst grace possible, and the men went back to work, or, at least, such as could get a chance did, and now affairs are once more, at least outwardly, quite serene, although fisticuffs between union and non-union men are said to be of frequent occurrence. Such disturbance of the street-railway traffic makes the advent of the elevated roads more than ever earnestly desired by those who have suffered, and, without doubt, this last strike has done much towards bringing several schemes of overhead transportation to the more favorable notice of the public. Already several ordinances have been passed by the City Council granting rights and privileges, and one company is even said to have made such progress as to have acquired several pieces of property, and to have consulted with architects in a preliminary way as regards depots, etc. However, all is as yet in quite a chaotic state, but it is promised that within six months, rights-of-way will be obtained and preliminary surveys finished, so that a long-suffering public even now commences to see with the eyes of faith the long-promised means of rapid transit.

In the last month the Trustees of the Art Institute have, owing to the generosity of one of our citizens, found themselves enabled to throw open the galleries to visitors on Sundays, free. The hours have been fixed between 1 and 5 P. M. This has long been desired, but the difficulty has been the additional expense of attendants. This has now been removed, at least for one year, by Mr. James W. Ellsworth, who takes upon himself to defray the extra cost. The hours have been chosen as above to avoid the criticism that it would interfere with church-going, and it is believed that a very large class who are not at liberty other days, and, who especially need art-improvement, will take advantage of this privilege.

MISTAKES IN ARCHITECTURE.[1] — I.

"WE are all of us wrong sometimes:" so spoke, in the hearing of a friend of mine, one of our best-known humorists and men of letters. They were together on a steamer, and were watching the floundering of a sailing-boat being navigated by a mariner who clearly had made a mistake in handling his craft. The famous man had a young daughter with him, and she asked, "What, — pray what, — is he doing, father?" and got the reply, "He is wrong, my dear; we are all of us wrong sometimes."

No truer word was ever spoken; and, if for no other reason than because it is so universal a fate to get wrong sometimes, mistakes would be justified as a subject for a lecture. But there is a much better reason for my selection of this subject. Forewarned is forearmed; and, though I cannot promise you an immunity from all mistakes, I can, I hope, point out some into which there might perhaps be some danger of your falling, and against which you will be likely to guard if your attention has been called to them.

A mistake is always an evil, and often a most serious evil. There are mistakes which a man may make inadvertently, and without blame, but which yet entail consequences more serious and lasting than those which follow many a crime. Shakespeare paints Wolsey as arrogant, unscrupulous, shrinking from nothing so that he might compass his ends; yet it is not any of the dark deeds with which he is credited that ruins him, but the blunder of laying a paper intended for his own eye alone before that of the king. It is only a mistake when a signalman gives the wrong signal, or a pointsman turns the points the wrong way, but it may lead to the slaughter of a score of innocent persons; or, to come nearer home, it is only a mistake to miscalculate a girder, or misjudge a foundation; yet it may lead to the ruin of a fine building and of its architect's career.

If, then, you succeed, hereafter, in steering clear of even a few mistakes in consequence of their having been pointed out here, that will be ample justification for our spending an hour together about this somewhat uninviting subject. I propose that we shall take up in the first place students' mistakes, and secondly, those of architects; and, though I will try to be orderly, I greatly fear that, as mistakes are

[1] A lecture delivered by Prof. T. Roger Smith, F. R. I. B. A., at the commencement of the session 1888-89 at University College, London.

subject to no rules that I know of, a discourse on them must of necessity be rather an irregular lecture. We shall, of course, have to leave unnoticed far more mistakes than can be considered; mistakes will therefore be selected which are, in the nature of things, not unlikely to occur. Many of them will be such as have actually come under my notice; and, in clearing some of them up, I shall ask leave now and again to borrow a hint from the proverbial wisdom of our forefathers.

There is one peculiarity about mistakes, and that which originates them, which makes it not a little difficult usefully to consider them in a mixed assembly. I allude to the difference in mistakes traceable to the wide differences in temperament, training, quality of mind, and habits between different men. Put two men to the same test, and they act differently. If that test be some circumstance in architectural study or practice, where there are several ways of going wrong, and but one of going right, each of them may make a mistake; yet it is all but certain that they will not both make the same mistake; they may each take a wrong road, but the roads will go in opposite directions. In acting as assessor in architectural competitions I have again and again seen this. One designer, for example, who is timid and perhaps inexperienced, with but cramped ideas, falls into the mistake of producing a formal, cold, spiritless design, correct perhaps, and possibly economical, but showing so little invention, and with so little worth remark about it, that it has no chance. His neighbor lets loose a fancy and fertility of design of which he is the fortunate possessor, utterly regardless of considerations of expense or suitability, and produces a splendid plan for a building that could not be put up for three times the money, and that, if erected, would be quite inappropriate to the site and purpose, and of course his failure is as complete as that of his rival.

Each of these two competitors has made the mistake of failing to understand what was wanted, but the failure has been in opposite directions. No. 1 has fallen short, No. 2 has overshot the mark. I shall have occasion in the course of the lecture to mention other mistakes which, so to speak, hunt in couples from this reason, and we may rest assured that many a man who is safe not to make a mistake in some one definite direction may be in great danger of running to the opposite extreme.

Student's Mistakes.— To turn now to students' mistakes. The one which first seems to present itself is neglecting opportunities. This, when wilfully done, is vicious; but it is a mistake often made out of pure thoughtlessness. Many a youth fails to realize that when he left school or college and entered an office he embarked upon a quite new career, and that he has to acquire knowledge in a different way, and to enter upon a totally distinct education. At school or college the schoolmaster or the professor teaches; in an architect's office the principal gives opportunities. The schoolboy, or, to a certain extent, the collegian, gets into difficulties if he omits or neglects to learn. There are no equally immediate uncomfortable results if a pupil neglects his opportunities; but, nevertheless, the loss to him is serious — in some cases irremediable — though in most instances, as I have said, I believe this neglect to arise entirely from failing to comprehend the situation, and not at all from wilfulness or idleness.

Every chance of taking part in what an architect or his assistant have to do in actual practice is an opportunity — even copying a letter, making a tracing, or entering a message in a call-book, is a lesson if the pupil chooses to learn from it: much more valuable are the chances of seeing work and materials. The nature and use of these opportunities have been dwelt upon very thoroughly in some of the published addresses of recent Presidents of the Architectural Association, and, to some extent, by myself on a former occasion of this sort; so that I hardly need pursue the topic further, but may turn to mistake number two.

It is a great mistake to lose heart and give up. I believe there comes to most young men a time when the novelty of their change of occupation and position has worn off and the irksomeness of routine is being felt, with possibly the depression due to being in lonely lodgings, instead of at a bright home or the sixth form of a busy school, and the wish to give up rises. Fortunately, in most cases this is practically impossible, and the student feels obliged to stick to his work, gets over his difficulties, regains heart, and goes on. But time and tone are often lost in the struggle, and it is a thing to fight against. Rest assured that, if your profession has been chosen with any degree of care, you are not likely to better yourselves by a change, and that to begin business life by losing a year or two, and starting afresh with the consciousness of a failure behind you, is, to say the least of it, unfortunate. Of course, occasionally a student turns up of whom one must in honesty say that the greatest mistake of his life was adopting the architectural profession. If a man is thoroughly unfit for a calling on which he has entered, by temperament, training, and habits, and he and his friends become honestly and deliberately aware that this is so, of course the only wise thing to do is to stop. But for one person who has really made such a mistake, there are probably a score who, for a time, fancy they have done so; therefore it is far safer to urge you to resist giving up than to suggest it as a good thing to do. Remember that "A rolling stone gathers no moss," and "Faint heart never won fair lady."

It is not, however, only the pupil who is apt to lose heart. There is a good deal of discouraging and difficult business to be got through by many young men in the interval between their articles and their start in practice, and again in the early days of practice. In all these difficulties, whatever you do, do not allow yourselves to be cast down. Constancy to a career is a matter to some extent, nay, to a very great extent, under a man's own control, and the man who succeeds is the one who resolves stoutly that, be the rebuffs or disappointments or perplexities never so trying, he will not allow them to master him, and who carries out that resolve.

The young man, perhaps fresh up from the country, who goes round to the offices of one architect after another, and who answers every advertisement in the papers, in the hope of getting employment, is on a very trying quest. But he is doing what most of us have had to do before him, and he is engaged in a way which has procured for many a man the opportunity of earning his daily bread, and for some has proved the first step in a career that has led to brilliant success. One of the most distinguished professional men of the day began his London career, when an unknown foreigner in our city, by answering the advertisement of a leading architect who wanted a young man to do nothing but trace in his office. This humble post he took, and filled sturdily till it was found how well he could do very much better work, and now his name is on every one's tongue. The proverb to take up when seeking for employment is: "Leave no stone unturned."

To the more advanced man, who is feeling — as who among us does not sometimes feel? — that it is very hard to get on, I may, perhaps, offer the suggestion once made to me by a very successful man when I was complaining that I found it difficult to get on. "Do not forget that the difficulties are your security" — a consideration which has so much in it when one comes to turn it about in one's mind, that I do not think any words of mine can add to its force.

One more proverb occurs to me: "Everything comes to the man who can wait." Everything that can come of itself seems to obey this law. Success is not quite included here, because — at any rate, in professional life — success can only come to the man who is fit to succeed. But, granted the fitness (and I trust you will all fit yourselves for success before your student career comes to a close) — granted the fitness, I repeat, even in so crowded a profession as ours, and so enormously difficult a place as London, success may fairly be expected to reward each man who can go on bravely struggling for a sufficiently long time, and who will not lose heart.

Once more, it is a mistake to lose heart if any particular attainment seems to elude you. Say you decide to draw the figure, the most valuable auxiliary to high-class architectural draughtsmanship, and you find it very difficult, or you decide to draw perspective, and you find it very perplexing. The thing to do is not to give up, but to go on; and if the difficulty takes twice the time and twice the trouble which it appears to have cost some comrade, believe me, the acquisition is more than twice as advantageous to you, and, indeed, more than twice as necessary for you as for him, so that your double trouble and double time have been well bestowed.

It is a mistake, if you have the opportunity of choosing what work you will do — an opportunity which to some extent a pupil often enjoys, though an assistant seldom — to stick too close to one thing. As far as possible, try to get a share in each sort of work that is in the office, and if it is work that you are not used to, and find difficult to perform, so much the more instructive is it likely to prove. It is also a mistake to shirk the work you do not fancy. A young friend of mine complained to me once that he was given a good many letters to write when he thought he ought to be drawing. I pointed out to him that when he was in practice he would have shoals of letters to write, and that the art of writing a good business letter does not come of itself — far from it; so that he ought not to object to have the opportunity given him of practising his hand upon what is as necessary a piece of attainment as draughtsmanship.

It is a mistake to take up too much that is outside your profession. Every young man ought to have some athletic pursuit — cricket, tennis, cycling, walking, riding, boating, swimming. But it is distracting to take up or keep up too many such pursuits, or give too much time to those you select. Similarly, some hobby or pursuit that is not exactly architectural, such as a certain amount of reading and a certain amount of society, are good, and, in moderation, desirable. But learning a profession is an arduous task, and the men who will succeed best are those who give up their evenings, night after night, to pursuits akin to architecture, such as a school of art, the Architectural Association classes and meetings, or working up privately book after book on construction, materials, etc., or practising design, or drawing, or working at the joiner's bench. You will find in many other professions the demands made upon the time and attention of students leave them for years little leisure for any outside pursuit whatever; and I do not think architecture requires less thorough devotion of time and power than does medicine, or law, or commerce, or that there is less to learn in architecture than those other professions.

It is a mistake not to sketch. Going and looking at architectural buildings is just a little better than not seeing them, but not of much permanent service. Photographs, whether you buy them, or, what is worse (because it takes so much time up), make them, are almost worthless as substitutes for the results of your own sketching and measuring. What you draw you look at — you, to some extent, understand, and you generally remember, while the drawing will always remind you of what you saw and tried to fix on your paper. Some young men are disposed when they get a summer holiday to boat or bathe, or ramble about, as if their daily occupations as archi-

tects were of no more interest to them than those of a linen-draper, and ought to be forgotten, instead of being fostered at holiday times. Holidays are the best opportunities of architectural study possible, and, let me add, as soon as the first difficulty of sketching architecture from buildings is got over, sketching tours are the most enjoyable holidays possible. More can be learned in a fortnight's well-directed sketching than in months of work over books and drawings, and I will engage to say that the architectural traveller gets twice as much enjoyment out of any trip which takes him to cities and towns of interest as any of the ordinary travellers he will fall in with on his route.

It is a mistake to sketch or to study alone, if it can be avoided. *Noscitur a sociis*, which, being freely Englished, is, "Birds of a feather flock together"; and, though a man's books and drawings are not bad companions, human comrades and friends are more useful, if only they be of the right sort. The best comrade for a beginner is one who is more advanced than himself, and, fortunately, the tyro, if teachable, is far from being the worst companion for the advanced student. Habits, circumstances and opportunities, of course, differ, and under certain conditions a man must study alone; but much time is often lost, and mistakes are apt to be made by those who work alone, and especially if they work without guidance. The opportunities of getting good instruction and of associating with other students are, fortunately, on the increase, and are so well known that I need not recapitulate them here; but I will add that studying together in this class-room has been, as I have reason to know, a beginning of student friendships, some of which have lasted through life.

On the choice of subjects of study I have not much to point out, but I cannot forbear saying that it is a mistake to despise surveying. Many students consider that they ought to prepare themselves for purely architectural practice, and for that only, and that everything which can go by the name of surveying is unnecessary, if not beneath them. They believe surveying to be, at any rate, wide of their line, and that it is to be accordingly shunned; but when they come to practice they will find that a certain amount of surveying work will come in their way, and must either be done or handed over to better-prepared persons. I am not now speaking of quantities, the preparation of which is to a large extent a distinct work, but of all that relates to the examination and care of existing buildings. If you reflect that in any city or town for one new building there are hundreds already in existence, and that each of these hundreds is likely to be repeatedly surveyed, now for repair, now for alteration or enlargement, now for sale, or purchase, or rating, and possibly again after injury by fire, you will see that the mass of surveying work in the aggregate is considerable. Much of this can be better done by an architect than by any other person, and from time to time every architect is asked to make surveys under circumstances which make it clear that if he cannot or will not, valuable connections will go elsewhere. Nor is this all. Architectural practice is always fluctuating, and not infrequently the question of surveying work or none is a question of bread-and-butter or none. So do not consider that surveys are nuisances or interruptions, but pick up what you can about them, and, if a chance offers, by all means try to see a little land-surveying. A very few days in the field will make the methods of working clear to any one who has not forgotten his trigonometry.

There is a companion mistake, one, I mean, of an opposite character, which is sometimes made, and which may as well be noticed. It is the mistake of neglecting design. Designing is the highest part of an architect's work, and it is work that he must be able to do. I am quite aware that it is of no use for a beginner to try to design. He has no materials yet, and it would probably be more likely to do him harm than good if he attempted to originate out of the emptiness of his knowledge something that should represent a building. But designing does not come of itself, and yet many students go on for years accumulating knowledge and experience, and make no attempt to exercise themselves in design. Whenever one has made a piece of architecture one's own by studying, sketching, and measuring it, it is a wise course to try to design a variation upon it, making use of the same features, details, and ornaments, but re-arranging them. This may be done, if you like, upon a single feature and an extremely small subject, and from such beginnings there are many ways of going on. What I wish to urge here is that it is a mistake not to begin.

The last mistake with regard to study that I feel bound to name is the mistake of not going on the Continent. This is, perhaps, not so prevalent as it was in the height of the Gothic revival time, when many good students believed that if they could thoroughly master English Gothic they need not attempt more. Now that Renaissance of some sort is being more generally practised, more men go to Italy and Greece, but still the number is small in comparison with the number of pupils and students. This, I repeat, is a great mistake, and if you say that it is a serious expense and absorbs much time — which are the two things that can be said against a Continental tour — the answer is that, as to time, it cannot be better spent, and, as to money, there are few liberal professions where some expense is not absolutely necessary at some time, while the scholarships and studentships obtainable give to a few students in each year substantial assistance. Certain it is that this period of continuous study in other countries, and under other suns, seems more than anything else to make the difference between the mere draughtsman and the accomplished architect.

[To be continued.]

SOCIETIES

BOSTON SOCIETY OF ARCHITECTS.

AT the last regular meeting of the Boston Society of Architects, held Friday, November 9, the following officers were elected for the ensuing year: President, Edward C. Cabot; Vice-President, Charles A. Cummings; Treasurer, William G. Preston; Secretary, Arthur G. Everett; Committee on Elections: John A. Fox, F. W. Chandler, Edmund M. Wheelwright.

COMMUNICATIONS

SLOW-BURNING CONSTRUCTION.

BOSTON, MASS., October 30, 1888.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs, — In rejoinder to the communication from "Salamander" published Oct. 27, I beg to say that the questions which I lately asked relating to construction, were not intended to apply very closely to dwelling-houses. The risk of loss by fire in dwelling-houses, especially of the second and third class, is very small for the reason that they are nearly always occupied by many persons and the fires are discovered quickly enough to be customarily extinguished without severe loss. The heaviest losses in dwelling-houses occur in first-class or palatial dwellings where the injury to the decorative part of the structure is often very great.

The mill methods might, however, be applied to dwelling houses. One has been constructed in this way at small cost by a gentleman who was formerly an inspector of this Company, to whom I have written for working plans and specifications. The cost did not exceed that of ordinary construction in any considerable measure. A somewhat costly dwelling-house has been built after this method in the neighborhood of Philadelphia, under the supervision of Mr. H. W. Brown, formerly President of the Philadelphia Mutual Fire Insurance Company, by whom, also, an office-building on Walnut Street was constructed in the same way which he afterward sold at an extra price on account of its great security from fire.

I would ask the following questions as this seems to be the best method of bringing out the facts:

Given a country dwelling-house to be covered-in either by a pitched roof, hipped roof, French roof or "crazy roof," of the ordinary construction; rafters eighteen inches to two feet on centres; covered with boards *not* customarily matched but laid open-jointed; occasionally back-plastered between the joist but more often plastered only on the line of the joists inside; to be covered with shingles or with slate. Although the inter-spaces between the joists are mostly stopped at the plate, are there not apt to be many means of communication between these hollow spaces and the hollow spaces in the walls of the house, these also being connected with the hollow spaces in the floors and partitions? Does not this convert the whole house into a series of connected wooden cells?

When the heat passes through the thin outer covering of the roof from which there is no ventilation at the top, does it not force its way down through the hollow walls of the house, thereby rendering the house much hotter in summer than it need be? Is there not an analogy between this sun-heated oven for the concentration of heat on the roof with the over-head system of heating by steam-pipes within the rooms of a factory, which has proved to be the most effective method of raising the temperature and distributing the heat within the factory itself?

Does not this cellular structure give opportunity for the free course not only of fire but of vermin of all sorts, no matter what precautions may be taken in putting stops above the sill for the purpose of keeping the vermin out? Would not this roof serve the purpose of keeping out heat, rain and snow very much more effectively if the inside timbers were worked of suitable size by computation of the load to which they may be subjected and were placed eight feet to ten feet apart on centres; if two-inch plank, grooved and splined, were then substituted for the thin, unmatched roof-boards, and if good shingles were always used in preference to slate? Or might not good one-inch boards grooved and splined be put on, then three-quarter-inch mortar, and then the shingles? According to our experience with factory roofs this would be the best method; we have specimens of shingles in good condition which are more than fifty years old, which were originally laid over mortar, the mortar being laid over the roof-boards.

What would be the difference in the quantity of timber and in the cost of this mode of constructing the roof of a dwelling-house as compared to the ordinary method?

I may refer to the laboratory and boarding-house combined in one large building at Woods Holl as an excellent example of the solid timber and plank construction, plastering laid directly on the plank, secured by dove-tailed lath. This large building was built under the supervision of the late Prof. Spencer F. Baird, the original specifications having been furnished from this office. I may refer to the large building lately constructed by Professor Morris at Cornell University, on the principle of slow-burning construction, the lower rooms of the two-story building being occupied as workshops, the upper room for drawing: the top floor of the second story consists of one-inch boards, the under floor of two-inch planks grooved and splined, with a layer of mortar between. Professor Morris assured me that this arrangement completely stopped the passage of sound. At the time when I visited the building the workshops were unoccupied and perfectly quiet; there were a large number of young men and women engaged in drawing in the room above; I could hear no sound although they were moving about in their ordinary manner.

It is for the purpose of inducing students to take up these problems and to develop the crude methods by which we have secured safety from fire in factories, to warehouses, churches, etc., that I have put the questions lately submitted; these questions are specially pertinent with respect to the construction of almshouses, hospitals and asylums.

Can the construction of a hospital, almshouse, asylum, college-building or library now be justified on the cellular principle? Hollow-floors, hollow-wall, hollow-roof, each connected with the other by wooden flues through which fire may pass from cellar to attic, thus assuring the maximum of loss from the minimum of cause? How many of the buildings of which you have given plans and elevations in the *American Architect* are stone or brick shams or veneers concealing this bad and dangerous mode of construction? E. A.

A CORRECTION.

New York, N. Y., October 31, 1888.

To the Editors of the American Architect: —

Dear Sirs, — Allow me to call your attention to the fact, that in the editorial in your issue of October 27, in computing price per pound of French and Belgian iron-beams, you assume a metric ton (*tonne*) to be 2680 pounds avoirdupois, whereas it is only 2204.7 pounds.

The metric ton of one thousand kilogrammes is about equal to 2680 pounds *Troy*.

The above-mentioned wrong assumption alone makes a great error in the price in cents per pound, as shown by you, and renders your comments upon, and deductions therefrom, useless, so that further comment is unnecessary.

I *believe* your quoted prices per hundred kilogrammes (13 francs for French and 11.75 francs for Belgian beams) refer to the smaller sizes of inferior quality, but as I do not know your authority for these quotations this last is only a belief as stated. As to your doubts regarding the ton recognized by the United States Custom House, I can say that the customs due on building-beams is one and one quarter (1¼) cents *per pound*, thus making a rate of $28.00 per ton of 2240 pounds. Traverse.

[We took the formula for converting kilogrammes to pounds which happened to be nearest at hand, — that in Cooke's "*Chemical Physics*," which was Troy pounds. This would make a difference of about twenty per cent in the figures, and would reduce the *ad valorem* equivalent of the specific duty to one hundred and twenty per cent, in place of one hundred and fifty. Our prices for French and Belgian beams were taken from the *Chronique Commerciale et Financière* of *Le Génie Civil*, as the market rates for "*fers à planchers*," nothing being said about dimensions or quality. — Eds. American Architect.]

NOTES AND CLIPPINGS

India-rubber Pavement. — The authorities of the city of Basle, says *The India-rubber and Gutta-percha Journal*, intend re-paving their principal thoroughfares, and are now considering the material best suited for the purpose. In one street a trial was given to wood pavement, but somehow it does not give satisfaction. The decision, therefore, turns upon asphalt or India-rubber. The latter was invented by the German engineer, Busse, in Linden, near Hanover, and was first practically used about fifteen months ago for paving the roadway over the Goethe Bridge in Hanover, which required about 1,000 square metres of material. This first experiment proved so successful that during the present year another street in Hanover was paved with India-rubber, to the extent of 1,500 square metres. Berlin is already considering the advisability of availing itself of the same pavement, and has given it a fair trial by laying it down over a considerable distance near the Lützow bank, which example is being followed by Hamburg. The India-rubber pavement is said to combine great elasticity with the hardness of stone, to be completely noiseless, and to suffer neither from cold nor hot weather. Moreover, it is not slippery, like asphalt, and is more durable. — *Invention.*

The London Monument in Possible Peril. — The danger to the Monument arising from the vibration caused by the trains on the Underground Railway, which is much nearer than Wren would have liked, and against which he would, had provisions been granted him, have provided as he did for the shaky foundation of the northeast pier of the cupola of St. Paul's, has suggested to many that the column should be strengthened below the surface of the earth. The recent fall of a portion of the cap had, we suppose, nothing to do with the tunnel. The nature of the stone may account for it, and we have no expectation of the Monument suddenly collapsing. Cracks would warn the custodians, who may possibly remember that the disintegration of the empire has been associated in a popular legend with the downfall of the Monument. To remove the column from its present position, where it combines with the neighboring buildings (as the great Roman columns did when they were erected), and is, therefore, alone of the metropolitan columns, appropriately placed, would be a folly no other time than the present — when every meddling simpleton has his say — could be expected to discuss. It would, however, have its parallels in the proposal to widen London Bridge on cantilevers (an outrage which the energy of Street and Sir F. Leighton hardly averted), and the removal of Decimus Burton's arch from Hyde Park Corner, which Mr. Shaw Lefevre actually carried out. — *London Athenæum.*

TRADE SURVEYS

Old signs for measuring or prognosticating commercial or industrial activity are proving unsafe. The new conditions into which the country is passing, are calling for new standards for calculation. The business interests have been surprised with the results so far this year. The railroad companies have been doing a larger business than they had anticipated. Gross earnings have been more satisfactory and net earnings have been far better than in last May or June, when the maximum point in cutting of rates had been reached in the Northwest. Notwithstanding so much was said about excessive railroad construction, the facts and statistics now show that the evil was overestimated. The numerous statistical tables and statements all converge on one point, namely, that traffic has been expanding week by week and month by month and that net earnings, while on some systems they have been very low are as a rule much better than we expected at the opening of the season. Railroad managers are encouraged, when the results of the season are all averaged up. Very careful railroad authorities in Chicago, announced last week that steps would be taken to put their various systems into an excellent condition of repair. That both locomotive capacity and rolling-stock would be largely added for next season, that a great deal of mileage would be entered upon to complete and round out the various systems converging at that point. Financial and railroad authorities in New York City have within the last few days announced their determination to enter upon the work of constructing new railroads, none of them very long but in the aggregate making a large amount of mileage, much more than was contemplated earlier in this year. There will be more North-and-South roads built next year than ever. The increasing intimacy between the States north and south of the Ohio River, is opening up opportunities for the expenditure of a great deal of money in the construction of lines which will expand the industrial conditions of the regions of country through which they pass. The out-flow of capital into these States south of the Ohio River which has assumed phenomenal proportions for two or three years past will exceed the volume of those years. The rank and file of investors who formerly invested in railroad building or in stocks are now crowding into other channels, principally manufacturing, where they are finding better returns. A system has been partially developed for the cooperation of small investors where for a small commission they can be furnished with opportunities to place their money. In this way a great deal of manufacturing capital has been well located in the region of country beyond the Mississippi and south of the Ohio. Steel rails dropped last week to $26.50 in Pennsylvania. Upwards of 100,000 tons have been sold within ten days. The rail-makers are undecided whether to accept the lower rate and book orders or to resist it by refusing to allow large allotments for the coming season. The makers of all kinds of iron are now in sight of a heavy demand for the coming winter, but the demand will not be sufficiently strong to advance prices. This is in their favor rather than against them. The coal-producing interests are still holding production to the utmost capacity. The anthracite output last week exceeded 32,000,000 tons or 3,300,000 tons in excess of the production at same date last year. Coke has been advanced and all buyers of coke are anxious to secure as much as they can. The Pennsylvania coal and coke tonnage for the past year foots up 13,136,115 tons, an increase over last year of 1,460 477 tons. The lumber traffic of the country when aggregated, shows a remarkable increase over last year in a few of the larger cities. The manufacturers of wood-working machinery in the Western States, have been doing a rather moderate business for three months past but within a few days some of the heaviest manufacturers have given out the opinion that there will be a rush of work during the coming winter. At certain points in the West, particularly Minnesota, there is a large accumulation of lumber but those who know most about the market, among both buyers and dealers, anticipate no depression in prices on this account. The movement of lumber from mills to market on the Great Lakes is enormous. Stocks are accumulating rapidly at all lake ports. So far the increase over last year is 150,000,000 feet at Tonawanda and Buffalo. There has been a slight falling off this fall in the demand for lumber in the larger eastern cities, but it has been compensated for by a heavier demand in the interior where the smaller towns are thriving under the stimulus of an increased demand for manufactured products. There is a general scarcity of cars upon nearly all railroads. Managers have been backward about placing orders on account of the small net earnings. A wiser policy will control railroad managers hereafter. Orders are now being received at several of the locomotive-works for engines, to be delivered next spring. There is a disposition to adopt the iron cars on many railroads, in place of wooden, and this new car will, no doubt, meet with a great deal of favor. One very encouraging feature that has developed itself within two weeks is the rush of orders for almost all kinds of hardware for the equipment of a good many shops. Those who have immense interests at stake, the success of which depend upon liberal supplies of currency, are pushing forward their various new enterprises, on the belief that the policy of the Government will be continued in the future as it has been in the past. Within three years, the volume of currency available for the exchange of commodities and services among the people has increased to the extent of $2,000,000. Any policy which would restrict the volume of currency would hamper trade and discourage new enterprises. The great captains of industry are giving more attention to the financial question than they did in years past, for they now recognize that the currency is the motive power which controls trade and expands or limits the industrial operations.

S. J. Parkhill & Co., Printers, Boston.